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FIELD AND OFFICE TABLES

SPECIALLY APPLICABLE TO RAILROADS

BY

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PREFACE

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It is hoped that these tables will be found more complete and perfect than those which have preceded. Among them are convenient tables for easement curves and for earthwork computation, several of which are altogether new. These include the "Cubic Spiral" easement curve, which is very simple, being arranged for a uniform chord length of 30 feet, and giving all deflection angles for a large variety of spirals; also the "Offsets from Tangent for a 10° Curve" and "Angles Proportionate to Squares of Distances," both of which are specially applicable to easement curves, but should be found useful for other purposes. The two latter allow the rapid and simple working of spirals of any length or for any set-off from the tangent.

The tables for Earthwork Computation should meet with favor. Those for regular three-level sections and for prismoidal correction are based upon tables used for computing the earthwork on many hundred miles on a prominent western railroad, and that for triangular prisms is similar in principle to that for prismoidal correction.

Other tables seldom found in books suitable for field use are "Acres for Strip 100 Feet Wide," "Metric Curves," "Velocity Heights," and "Mean Refractions in Declination," while the "Stadia Reduction Tables" are more complete than those common in field tables.

The table for "Tangent Distances for a 1° Curve" gives values for every minute up to 96° and the table of "Corrections" is full enough to render interpolation unnecessary. This will allow greater speed and the saving of much time for an entire field party.

There are many points of arrangement and typography which are intended to facilitate work or render errors less probable. Great care has been taken both in computing and proof-reading to secure absence from error. The plate-proof has been twice read under the author's direction, and other tests applied which have required the use (in adding) of every figure in the tables. The opportunity for comparison with other published tables and the running down of discrepancies has given opportunity for a high degree of accuracy, and these tables are believed to be superior in this respect.

The "Barometric Heights" are Professor Airy's and the "Stadia Reductions" are Winslow's from the "Reports of the Pennsylvania Geological Survey." The "Logarithms" and "Sines, Cosines, Tangents and Cotangents," both natural and logarithmic, are taken from the copyrighted "Wells' Six Place Logarithmic Tables" by permission of Prof. Webster Wells and of D. C. Heath & Co., his publishers; and the "Refractions in Declination," also copyrighted, from the "Manual" published by W. and L. E. Gurley, who have permitted their use. Almost, if not quite, all other tables have been calculated anew; seven place tables of logarithms and logarithmic functions have been largely used, but all numbers doubtful in the last place have been worked out by ten place tables which have necessarily been in very frequent use. No pains have been spared to make the last figure correct. The author desires to thank every one who has helped in the preparation of this book by suggestion or otherwise, and especially Mr. C. B. Breed, of the Massachusetts Institute of Technology, for frequent advice and assistance in arrangement and preparation of work; to Mr. E. S. Manson, Jr., S. M., who computed some of the most important tables, including Tables I, III, XV; to Miss V. W. Porter for very faithful and efficient work both in computations and comparisons and proof-reading; and to W. & L. E. Gurley, to D. C. Heath & Co., and to Prof. Webster Wells for their courteous permission to use their books as stated above.

These tables will be published separately and also in combination with the Author's book on "Railroad Curves and Earthwork."

JULY, 1903

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TABLE I.—RADII AND THEIR LOGARITHMS.

g. .	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.
0'	∞	∞	1° 0'	5729.65	3.758128	2° 0'	2864.93	3.457115
1	343774.68	5.536274	1	5635.72	.750950	1	2841.26	.453511
2	171887.34	.235244	2	5544.83	.743888	2	2817.97	.449937
3	114591.56	.059153	3	5456.82	.736939	3	2795.06	.446392
4	85943.67	4.934214	4	5371.56	.730100	4	2772.53	.442876
5	68754.94	4.837304	5	5288.92	3.723367	5	2750.35	3.439388
6	57295.79	.758123	6	5208.79	.716737	6	2728.52	.435928
7	49110.68	.691176	7	5131.05	.710206	7	2707.04	.432495
8	42971.84	.633184	8	5055.59	.703772	8	2685.89	.429089
9	38197.20	.582031	9	4982.33	.697432	9	2665.08	.425710
10	34377.48	4.536274	10	4911.15	3.691183	10	2644.58	3.422356
11	31252.26	.494881	11	4841.98	.685023	11	2624.39	.419029
12	28647.90	.457093	12	4774.74	.678949	12	2604.51	.415727
13	26444.22	.422331	13	4709.33	.672959	13	2584.93	.412449
14	24555.35	.390146	14	4645.69	.667051	14	2565.65	.409197
15	22918.33	4.360183	15	4583.75	3.661221	15	2546.64	3.405968
16	21485.94	.332154	16	4523.44	.655469	16	2527.92	.402763
17	20222.06	.305825	17	4464.70	.649792	17	2509.47	.399582
18	19098.61	.281002	18	4407.46	.644189	18	2491.29	.396424
19	18093.43	.257521	19	4351.67	.638656	19	2473.37	.393289
20	17188.76	4.235244	20	4297.28	3.633194	20	2455.70	3.390176
21	16370.25	.214055	21	4244.23	.627799	21	2438.29	.387085
22	15626.15	.193852	22	4192.47	.622470	22	2421.12	.384016
23	14946.75	.174547	23	4141.96	.617206	23	2404.19	.380969
24	14323.97	.156064	24	4092.66	.612005	24	2387.50	.377943
25	13751.02	4.138335	25	4044.51	3.606866	25	2371.04	3.374938
26	13222.13	.121302	26	3997.48	.601787	26	2354.80	.371954
27	12732.43	.104911	27	3951.54	.596766	27	2338.78	.368990
28	12277.70	.089117	28	3906.64	.591803	28	2322.98	.366046
29	11854.33	.073877	29	3862.74	.586896	29	2307.39	.363122
30	11459.19	4.059154	30	3819.83	3.582044	30	2292.01	3.360217
31	11089.54	.044914	31	3777.85	.577245	31	2276.84	.357332
32	10743.00	.031125	32	3736.79	.572499	32	2261.86	.354466
33	10417.45	.017762	33	3696.61	.567804	33	2247.08	.351618
34	10111.06	.004797	34	3657.29	.563160	34	2232.49	.348789
35	9822.18	3.992208	35	3618.80	3.558564	35	2218.09	3.345979
36	9549.34	.979973	36	3581.10	.554017	36	2203.87	.343187
37	9291.25	.968074	37	3544.19	.549517	37	2189.84	.340412
38	9046.75	.956492	38	3508.02	.545063	38	2175.98	.337655
39	8814.78	.945212	39	3472.59	.540654	39	2162.30	.334915
40	8594.42	3.934216	40	3437.87	3.536289	40	2148.79	3.332193
41	8384.80	.923493	41	3403.83	.531968	41	2135.44	.329488
42	8185.16	.913027	42	3370.46	.527690	42	2122.26	.326799
43	7994.81	.902808	43	3337.74	.523453	43	2109.24	.324127
44	7813.11	.892824	44	3305.65	.519257	44	2096.39	.321471
45	7639.49	3.883064	45	3274.17	3.515101	45	2083.68	3.318832
46	7473.42	.873519	46	3243.29	.510985	46	2071.13	.316208
47	7314.41	.864179	47	3212.98	.506908	47	2058.73	.313600
48	7162.03	.855036	48	3183.23	.502868	48	2046.48	.311008
49	7015.87	.846081	49	3154.03	.498866	49	2034.37	.308431
50	6875.55	3.837308	50	3125.36	3.494900	50	2022.41	3.305869
51	6740.74	.828708	51	3097.20	.490970	51	2010.59	.303323
52	6611.12	.820275	52	3069.55	.487075	52	1998.90	.300791
53	6486.38	.812002	53	3042.39	.483215	53	1987.35	.298274
54	6366.26	.803885	54	3015.71	.479389	54	1975.93	.295771
55	6250.51	3.795916	55	2989.48	3.475596	55	1964.64	3.293283
56	6138.90	.788091	56	2963.72	.471836	56	1953.48	.290809
57	6031.20	.780404	57	2938.39	.468109	57	1942.44	.288349
58	5927.22	.772851	58	2913.49	.464413	58	1931.53	.285902
59	5826.76	.765427	59	2889.01	.460749	59	1920.75	.283470
60	5729.65	3.758128	60	2864.93	3.457115	60	1910.08	3.281051

TABLE I.—RADII AND THEIR LOGARITHMS.

Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.
3° 0′	1910.08	3.281051	4° 0′	1432.69	3.156151	5° 0′	1146.28	3.059290
1	1899.53	.278645	1	1426.74	.154346	1	1142.47	.057846
2	1889.09	.276253	2	1420.85	.152548	2	1138.69	.056407
3	1878.77	.273874	3	1415.01	.150758	3	1134.94	.054972
4	1868.56	.271508	4	1409.21	.148975	4	1131.21	.053542
5	1858.47	3.269155	5	1403.46	3.147200	5	1127.50	3.052116
6	1848.48	.266814	6	1397.76	.145431	6	1123.82	.050696
7	1838.59	.264486	7	1392.10	.143670	7	1120.16	.049280
8	1828.82	.262170	8	1386.49	.141916	8	1116.52	.047868
9	1819.14	.259867	9	1380.92	.140169	9	1112.91	.046462
10	1809.57	3.257576	10	1375.40	3.138430	10	1109.33	3.045059
11	1800.10	.255296	11	1369.92	.136697	11	1105.76	.043662
12	1790.73	.253029	12	1364.49	.134971	12	1102.22	.042268
13	1781.45	.250774	13	1359.10	.133251	13	1098.70	.040880
14	1772.27	.248530	14	1353.75	.131539	14	1095.20	.039495
15	1763.18	3.246297	15	1348.45	3.129833	15	1091.73	3.038115
16	1754.19	.244077	16	1343.18	.128134	16	1088.28	.036740
17	1745.29	.241867	17	1337.96	.126442	17	1084.85	.035368
18	1736.48	.239669	18	1332.77	.124756	18	1081.44	.034002
19	1727.75	.237481	19	1327.63	.123077	19	1078.05	.032639
20	1719.12	3.235305	20	1322.53	3.121404	20	1074.68	3.031281
21	1710.57	.233140	21	1317.46	.119738	21	1071.34	.029927
22	1702.10	.230985	22	1312.43	.118078	22	1068.01	.028577
23	1693.72	.228841	23	1307.45	.116424	23	1064.71	.027231
24	1685.42	.226707	24	1302.50	.114777	24	1061.43	.025890
25	1677.20	3.224584	25	1297.58	3.113136	25	1058.16	3.024552
26	1669.06	.222472	26	1292.71	.111501	26	1054.92	.023219
27	1661.00	.220369	27	1287.87	.109872	27	1051.70	.021890
28	1653.02	.218277	28	1283.07	.108249	28	1048.49	.020565
29	1645.11	.216194	29	1278.30	.106632	29	1045.31	.019244
30	1637.28	3.214122	30	1273.57	3.105022	30	1042.14	3.017927
31	1629.52	.212060	31	1268.87	.103417	31	1039.00	.016614
32	1621.84	.210007	32	1264.21	.101818	32	1035.87	.015305
33	1614.22	.207964	33	1259.58	.100225	33	1032.76	.013999
34	1606.68	.205930	34	1254.98	.098638	34	1029.67	.012698
35	1599.21	3.203906	35	1250.42	3.097057	35	1026.60	3.011401
36	1591.81	.201892	36	1245.89	.095481	36	1023.55	.010107
37	1584.48	.199886	37	1241.40	.093912	37	1020.51	.008818
38	1577.21	.197890	38	1236.94	.092347	38	1017.49	.007532
39	1570.01	.195903	39	1232.51	.090789	39	1014.50	.006250
40	1562.88	3.193925	40	1228.11	3.089236	40	1011.51	3.004972
41	1555.81	.191956	41	1223.74	.087688	41	1008.55	.003698
42	1548.80	.189996	42	1219.40	.086147	42	1005.60	.002427
43	1541.86	.188045	43	1215.09	.084610	43	1002.67	.001160
44	1534.98	.186103	44	1210.82	.083079	44	999.76	2.999897
45	1528.16	3.184169	45	1206.57	3.081553	45	996.87	2.998637
46	1521.40	.182244	46	1202.36	.080033	46	993.99	.997381
47	1514.70	.180327	47	1198.17	.078518	47	991.13	.996129
48	1508.06	.178419	48	1194.01	.077008	48	988.28	.994880
49	1501.48	.176519	49	1189.88	.075504	49	985.45	.993635
50	1494.95	3.174627	50	1185.78	3.074005	50	982.64	2.992393
51	1488.48	.172744	51	1181.71	.072511	51	979.84	.991155
52	1482.07	.170868	52	1177.66	.071022	52	977.06	.989921
53	1475.71	.169001	53	1173.65	.069538	53	974.29	.988690
54	1469.41	.167142	54	1169.66	.068059	54	971.54	.987463
55	1463.16	3.165291	55	1165.70	3.066585	55	968.81	2.986239
56	1456.96	.163447	56	1161.76	.065116	56	966.09	.985018
57	1450.81	.161612	57	1157.85	.063653	57	963.39	.983801
58	1444.72	.159784	58	1153.97	.062194	58	960.70	.982587
59	1438.68	.157963	59	1150.11	.060740	59	958.02	.981377
60	1432.69	3.156151	60	1146.28	3.059290	60	955.37	2.980170

TABLE I.—RADII AND THEIR LOGARITHMS

Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R
6° 0′	955.37	2.980170	7° 0′	819.02	2.913295	8° 0′	716.78	2.855385
1	952.72	.978966	1	817.08	.912263	1	715.29	.854483
2	950.09	.977766	2	815.14	.911234	2	713.81	.853583
3	947.48	.976569	3	813.22	.910208	3	712.33	.852684
4	944.88	.975375	4	811.30	.909183	4	710.87	.851787
5	942.29	2.974185	5	809.40	2.908162	5	709.40	2.850892
6	939.72	.972998	6	807.50	.907142	6	707.94	.849999
7	937.16	.971814	7	805.61	.906125	7	706.49	.849108
8	934.62	.970633	8	803.73	.905111	8	705.05	.848219
9	932.09	.969456	9	801.86	.904098	9	703.61	.847331
10	929.57	2.968282	10	800.00	2.903089	10	702.18	2.846446
11	927.07	.967111	11	798.14	.902081	11	700.75	.845562
12	924.58	.965943	12	796.30	.901076	12	699.33	.844679
13	922.10	.964778	13	794.46	.900073	13	697.91	.843799
14	919.64	.963616	14	792.63	.899073	14	696.50	.842921
15	917.19	2.962458	15	790.81	2.898074	15	695.09	2.842044
16	914.75	.961303	16	789.00	.897079	16	693.70	.841160
17	912.33	.960150	17	787.20	.896085	17	692.30	.840296
18	909.92	.959001	18	785.40	.895094	18	690.91	.839424
19	907.52	.957855	19	783.62	.894104	19	689.53	.838555
20	905.13	2.956711	20	781.84	2.893118	20	688.16	2.837687
21	902.76	.955571	21	780.07	.892133	21	686.78	.836821
22	900.40	.954434	22	778.31	.891151	22	685.42	.835956
23	898.05	.953300	23	776.55	.890171	23	684.06	.835093
24	895.71	.952168	24	774.81	.889193	24	682.70	.834232
25	893.39	2.951040	25	773.07	2.888217	25	681.35	2.833373
26	891.08	.949915	26	771.34	.887244	26	680.01	.832515
27	888.78	.948792	27	769.61	.886272	27	678.67	.831660
28	886.49	.947673	28	767.90	.885303	28	677.34	.830805
29	884.21	.946556	29	766.19	.884336	29	676.01	.829953
30	881.95	2.945442	30	764.49	2.883371	30	674.69	2.829102
31	879.69	.944331	31	762.80	.882409	31	673.37	.828253
32	877.45	.943223	32	761.11	.881448	32	672.06	.827405
33	875.22	.942118	33	759.43	.880490	33	670.75	.826560
34	873.00	.941015	34	757.76	.879534	34	669.45	.825715
35	870.79	2.939916	35	756.10	2.878580	35	668.15	2.824873
36	868.60	.938819	36	754.44	.877627	36	666.86	.824032
37	866.41	.937725	37	752.80	.876678	37	665.57	.823193
38	864.24	.936633	38	751.16	.875730	38	664.29	.822355
39	862.07	.935545	39	749.52	.874784	39	663.01	.821519
40	859.92	2.934459	40	747.89	2.873840	40	661.74	2.820685
41	857.78	.933376	41	746.27	.872898	41	660.47	.819852
42	855.65	.932295	42	744.66	.871959	42	659.21	.819021
43	853.53	.931218	43	743.06	.871021	43	657.95	.818191
44	851.42	.930142	44	741.46	.870086	44	656.69	.817363
45	849.32	2.929070	45	739.87	2.869152	45	655.45	2.816537
46	847.23	.928000	46	738.28	.868221	46	654.20	.815712
47	845.15	.926933	47	736.70	.867291	47	652.96	.814889
48	843.08	.925869	48	735.13	.866363	48	651.73	.814067
49	841.02	.924807	49	733.56	.865438	49	650.50	.813247
50	838.97	2.923747	50	732.01	2.864514	50	649.27	2.812428
51	836.93	.922691	51	730.45	.863593	51	648.05	.811611
52	834.90	.921637	52	728.91	.862673	52	646.84	.810796
53	832.88	.920585	53	727.37	.861755	53	645.63	.809982
54	830.88	.919536	54	725.84	.860840	54	644.42	.809160
55	828.88	2.918490	55	724.31	2.859926	55	643.22	2.808358
56	826.89	.917446	56	722.79	.859014	56	642.02	.807549
57	824.91	.916404	57	721.28	.858104	57	640.83	.806741
58	822.93	.915365	58	719.77	.857196	58	639.64	.805935
59	820.97	.914329	59	718.27	.856290	59	638.45	.805130
60	819.02	2.913295	60	716.78	2.855385	60	637.27	2.804327

TABLE I.—RADII AND THEIR LOGARITHMS.

Deg D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.
9° 0′	637.27	2.804327	11° 0′	521.67	2.717397	13° 0′	441.68	2.645111
2	634.93	.802724	2	520.10	.716087	2	440.56	.644004
4	632.60	.801128	4	518.54	.714781	4	439.44	.642899
6	630.29	.799538	6	516.99	.713479	6	438.33	.641798
8	627.99	.797953	8	515.44	.712181	8	437.22	.640699
10	625.71	2.796374	10	513.91	2.710887	10	436.12	2.639603
12	623.45	.794801	12	512.38	.709596	12	435.02	.638510
14	621.20	.793234	14	510.87	.708310	14	433.93	.637419
16	618.97	.791673	16	509.36	.707027	16	432.84	.636331
18	616.76	.790117	18	507.86	.705748	18	431.76	.635246
20	614.56	2.788566	20	506.38	2.704473	20	430.69	2.634164
22	612.38	.787021	22	504.90	.703202	22	429.62	.633085
24	610.21	.785482	24	503.42	.701934	24	428.56	.632008
26	608.06	.783948	26	501.96	.700671	26	427.50	.630934
28	605.93	.782420	28	500.51	.699410	28	426.44	.629863
30	603.80	2.780897	30	499.06	2.698154	30	425.40	2.628794
32	601.70	.779379	32	497.62	.696901	32	424.35	.627728
34	599.61	.777867	34	496.19	.695652	34	423.32	.626665
36	597.53	.776360	36	494.77	.694407	36	422.28	.625604
38	595.47	.774858	38	493.36	.693165	38	421.26	.624546
40	593.42	2.773361	40	491.96	2.691926	40	420.23	2.623490
42	591.38	.771870	42	490.56	.690692	42	419.22	.622437
44	589.36	.770383	44	489.17	.689460	44	418.20	.621387
46	587.36	.768902	46	487.79	.688233	46	417.19	.620339
48	585.36	.767426	48	486.42	.687008	48	416.19	.619294
50	583.38	2.765955	50	485.05	2.685788	50	415.19	2.618251
52	581.42	.764489	52	483.69	.684570	52	414.20	.617211
54	579.46	.763028	54	482.34	.683357	54	413.21	.616173
56	577.53	.761572	56	481.00	.682146	56	412.23	.615138
58	575.60	.760120	58	479.67	.680939	58	411.25	.614106
10° 0′	573.69	2.758674	12° 0′	478.34	2.679735	14° 0′	410.28	2.613076
2	571.78	.757232	2	477.02	.678535	2	409.31	.612048
4	569.90	.755796	4	475.71	.677338	4	408.34	.611023
6	568.02	.754364	6	474.40	.676145	6	407.38	.610000
8	566.16	.752937	8	473.10	.674954	8	406.42	.608980
10	564.31	2.751514	10	471.81	2.673767	10	405.47	2.607962
12	562.47	.750096	12	470.53	.672584	12	404.53	.606946
14	560.64	.748683	14	469.25	.671403	14	403.58	.605933
16	558.82	.747274	16	467.98	.670226	16	402.65	.604923
18	557.02	.745870	18	466.72	.669052	18	401.71	.603914
20	555.23	2.744471	20	465.46	2.667881	20	400.78	2.602908
22	553.45	.743076	22	464.21	.666713	22	399.86	.601905
24	551.68	.741686	24	462.96	.665549	24	398.94	.600904
26	549.92	.740300	26	461.73	.664388	26	398.02	.599905
28	548.17	.738918	28	460.50	.663229	28	397.11	.598908
30	546.44	2.737541	30	459.28	2.662074	30	396.20	2.597914
32	544.71	.736169	32	458.06	.660922	32	395.30	.596922
34	543.00	.734800	34	456.85	.659773	34	394.40	.595933
36	541.30	.733436	36	455.65	.658628	36	393.50	.594945
38	539.61	.732077	38	454.45	.657485	38	392.61	.59396
40	537.92	2.730721	40	453.26	2.656345	40	391.72	2.59297
42	536.25	.729370	42	452.07	.655208	42	390.84	.59199
44	534.59	.728023	44	450.89	.654075	44	389.96	.59101
46	532.94	.726681	46	449.72	.652944	46	389.08	.59004
48	531.30	.725342	48	448.56	.651816	48	388.21	.58906
50	529.67	2.724008	50	447.40	2.650691	50	387.34	2.58809
52	528.05	.722677	52	446.24	.649570	52	386.48	.58712
54	526.44	.721351	54	445.09	.648451	54	385.62	.58616
56	524.84	.720029	56	443.95	.647335	56	384.77	.58519
58	523.25	.718711	58	442.81	.646221	58	383.91	.58423
60	521.67	2.717397	60	441.68	2.645111	60	383.06	2.58327

TABLE I.—RADII AND THEIR LOGARITHMS.

Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.	Deg. D.	Radius R.	Log. R.
15° 0′	383.06	2.583272	20° 0′	287.94	2.459300	30° 0′	193.19	2.285974
5	380.96	580880	10	285.58	455733	10	192.14	283623
10	378.88	578501	20	283.27	452195	20	191.11	281286
15	376.82	576135	30	280.99	448688	30	190.09	278963
20	374.79	573783	40	278.75	445209	40	189.08	276652
25	372.77	571443	50	276.54	441759	50	188.09	274355
30	370.78	2.569116	21° 0′	274.37	2.438337	31° 0′	187.10	2.272071
35	368.81	566802	10	272.23	434943	10	186.12	269800
40	366.86	564500	20	270.13	431575	20	185.16	267541
45	364.93	562210	30	268.06	428235	30	184.20	265295
50	363.02	559933	40	266.02	424921	40	183.26	263062
55	361.13	557668	50	264.02	421633	50	182.32	260841
16° 0′	359.26	2.555415	22° 0′	262.04	2.418371	32° 0′	181.40	2.258632
5	357.42	553173	10	260.10	415134	10	180.48	256435
10	355.59	550944	20	258.18	411922	20	179.58	254250
15	353.77	548726	30	256.29	408734	30	178.68	252077
20	351.98	546519	40	254.43	405571	40	177.79	249916
25	350.21	544324	50	252.60	402431	50	176.92	247766
30	348.45	2.542140	23° 0′	250.79	2.399315	33° 0′	176.05	2.245628
35	346.71	539968	10	249.01	396222	10	175.19	243501
40	344.99	537806	20	247.26	393151	20	174.34	241386
45	343.29	535655	30	245.53	390103	30	173.49	239282
50	341.60	533516	40	243.82	387077	40	172.66	237188
55	339.93	531386	50	242.14	384073	50	171.83	235106
17° 0′	338.27	2.529268	24° 0	240.49	2.381091	34° 0′	171.02	2.233035
5	336.64	527160	10	238.85	378130	10	170.21	230974
10	335.01	525062	20	237.24	375190	20	169.40	228924
15	333.41	522975	30	235.65	372270	30	168.61	226884
20	331.82	520898	40	234.08	369371	40	167.82	224855
25	330.24	518831	50	232.54	366492	50	167.05	222837
30	328.68	2.516774	25° 0′	231.01	2.363633	35° 0′	166.28	2.220828
35	327.13	514727	10	229.51	360794	10	165.51	218830
40	325.60	512690	20	228.02	357974	20	164.76	216842
45	324.09	510662	30	226.55	355173	30	164.01	214863
50	322.59	508645	40	225.11	352391	40	163.27	212895
55	321.10	506636	50	223.68	349627	50	162.53	210937
18° 0′	319.62	2.504638	26° 0′	222.27	2.346882	36° 0′	161.80	2.208988
5	318.16	502648	10	220.88	344155	10	161.08	207048
10	316.71	500668	20	219.51	341446	20	160.37	205119
15	315.28	498697	30	218.15	338755	30	159.66	203198
20	313.86	496736	40	216.81	336081	40	158.96	201288
25	312.45	494783	50	215.49	333424	50	158.27	199386
30	311.06	2.492839	27° 0′	214.18	2.330785	37° 0′	157.58	2.197494
35	309.67	490904	10	212.89	328162	10	156.90	195610
40	308.30	488978	20	211.62	325556	20	156.22	193736
45	306.95	487061	30	210.36	322967	30	155.55	191871
50	305.60	485152	40	209.12	320393	40	154.89	190014
55	304.27	483252	50	207.89	317836	50	154.23	188167
19° 0′	302.94	2.481361	28° 0′	206.68	2.315295	38° 0′	153.58	2.186328
5	301.63	479478	10	205.48	312769	10	152.93	184498
10	300.33	477603	20	204.30	310259	20	152.29	182676
15	299.04	475736	30	203.13	307764	30	151.66	180863
20	297.77	473878	40	201.97	305285	40	151.03	179059
25	296.50	472028	50	200.83	302820	50	150.41	177263
30	295 25	2.470186	29° 0′	199.70	2.300370	39° 0′	149.79	2.175475
35	294.00	468352	10	198.58	297935	10	149.17	173695
40	292.77	466526	20	197.48	295515	20	148.57	171924
45	291.55	464708	30	196.38	293108	30	147.97	170160
50	290.33	462897	40	195.31	290716	40	147.37	168405
55	289.13	461095	50	194.24	288338	50	146.78	166658
60	287.94	2.459300	60	193.19	2.285974	60	146.19	2.164918

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	M.
0	0.0	50.0	100.0	150.0	200.1	250.2	300.3	350.4	400.7	450.9	0
1	0.8	50.8	00.8	50.9	00.9	51.0	01.1	51.3	01.5	51.8	1
2	1.7	51.7	01,7	51.7	01.8	51.8	01.9	52.1	02.3	52.6	2
3	2.5	52.5	02.5	52.5	02.6	52.7	02.8	52.9	03.2	53.4	3
4	3.3	53.3	03.3	53.4	03.4	53.5	03.6	53.8	04.0	54.3	4
5	4.2	54.2	104.2	154.2	204.3	254.3	304.5	354.6	404.8	455.1	5
6	5.0	55.0	05.0	55.0	05.1	55.2	05.3	55.5	05.7	56.0	6
7	5.8	55.8	05.8	55.9	05.9	56.0	06.1	56.3	06.5	56.8	7
8	6.7	56.7	06.7	56.7	06.8	56.8	07.0	57.1	07.4	57.6	8
9	7.5	57.5	07.5	57.5	07.6	57.7	07.8	58.0	08.2	58.5	9
10	8.3	58.3	108.3	158.4	208.4	258.5	308.6	358.8	409.0	459.3	10
11	9.2	59.2	09.2	59.2	09.3	59.3	09.5	59.6	09.9	60.2	11
12	10.0	60.0	10.0	60.0	10.1	60.2	10.3	60.5	10,7	61.0	12
13	10.8	60.8	10.8	60.9	10.9	61.0	11.1	61.3	11.5	61.8	13
14	11.7	61.7	11.7	61.7	11.8	61.9	12.0	62.2	12.4	62.7	14
15	12.5	62.5	112.5	162.5	212.6	262.7	312.8	363.0	413.2	463.5	15
16	13.3	63.3	13.3	63.4	13.4	63.5	13.7	63.8	14.1	64.4	16
17	14.2	64.2	14.2	64.2	14.3	64.4	14.5	64.7	14.9	65.2	17
18	15.0	65.0	15.0	65.0	15.1	65.2	15.3	65.5	15.7	66.0	18
19	15.8	65.8	15.9	65.9	15.9	66.0	16.2	66.3	16.6	66.9	19
20	16.7	66.7	116.7	166,7	216.8	266.9	317.0	367.2	417.4	467.7	20
21	17.5	67.5	17.5	67.6	17.6	67.7	17.8	68.0	18.2	68.5	21
22	18.3	68.3	18.4	68.4	18.4	68.5	18.7	68.8	19.1	69.4	22
23	19.2	69.2	19.2	69.2	19.3	69.4	19.5	69.7	19.9	70.2	23
24	20.0	70.0	20.0	70.1	20.1	70.2	20.3	70.5	20.8	71.1	24
25	20.8	70.8	120.9	170.9	220.9	271.0	321.2	371.4	421.6	471.9	25
26	21.7	71.7	21.7	71.7	21.8	71.9	22.0	72.2	22.4	72.7	26
27	22.5	72.5	22.5	72.6	22.6	72.7	22.8	73.0	23.3	73.6	27
28	23.3	73.3	23.4	73.4	23.4	73.5	23.7	73.9	24.1	74.4	28
29	24.2	74.2	24.2	74.2	24.3	74.4	24.5	74.7	24.9	75.3	29
30	25.0	75.0	125.0	175.1	225.1	275.2	325.4	375.5	425.8	476.1	30
31	25.8	75.8	25.9	75.9	26.0	76.1	26.2	76.4	26.6	76.9	31
32	26.7	76.7	26.7	76.7	26.8	76.9	27.0	77.2	27.5	77.8	32
33	27.5	77.5	27.5	77.6	27.6	77.7	27.9	78.1	28.3	78.6	33
34	28.3	78.3	28.4	78.4	28.5	78.6	28.7	78.9	29.1	79.5	34
35	29.2	79.2	129.2	179.2	229.3	279.4	329.5	379.7	430.0	480.3	35
36	30.0	80.0	30.0	80.1	30.1	80.2	30.4	80.6	30.8	81.1	36
37	30.8	80.8	30.9	80.9	31.0	81.1	31.2	81.4	31.7	82.0	37
38	31.7	81.7	31.7	81.7	31.8	81.9	32.0	82.2	32.5	82.8	38
39	32.5	82.5	32.5	82.6	32.6	82.7	32.9	83.1	33.3	83.6	39
40	33.3	83.3	133.4	183.4	233.5	283.6	333.7	383.9	434.2	484.5	40
41	34.2	84.2	34.2	84.2	34.3	84.4	34.6	84.7	35.0	85.3	41
42	35.0	85.0	35.0	85.1	35.1	85.2	35.4	85.6	35.8	86.2	42
43	35.8	85.8	35.9	85.9	36.0	86.1	36.2	86.4	36.7	87.0	43
44	36.7	86.7	36.7	86.7	36.8	86.9	37.1	87.3	37.5	87.8	44
45	37.5	87.5	137.5	187.6	237.6	287.7	337.9	388.1	438.4	488.7	45
46	38.3	88.3	38.4	88.4	38.5	88.6	38.7	88.9	39.2	89.5	46
47	39.2	89.2	39.2	89.2	39.3	89.4	39.6	89.8	40.0	90.4	47
48	40.0	90.0	40.0	90.1	40.1	90.3	40.4	90.6	40.9	91.2	48
49	40.8	90.8	40.9	90.9	41.0	91.1	41.2	91.4	41.7	92.0	49
50	41.7	91.7	141.7	191.7	241.8	291.9	342.1	392.3	442.5	492.9	50
51	42.5	92.5	42.5	92.6	42.6	92.8	42.9	93.1	43.4	93.7	51
52	43.3	93.3	43.4	93.4	43.5	93.6	43.7	94.0	44.2	94.6	52
53	44.2	94.2	44.2	94.2	44.3	94.4	44.6	94.8	45.1	95.4	53
54	45.0	95.0	45.0	95.1	45.2	95.3	45.4	95.6	45.9	96.2	54
55	45.8	95.8	145.9	195.9	246.0	296.1	346.3	396.5	446.7	497.1	55
56	46.7	96.7	46.7	96.7	46.8	96.9	47.1	97.3	47.6	97.9	56
57	47.5	97.5	47.5	97.6	47.7	97.8	47.9	98.1	48.4	98.8	57
58	48.3	98.3	48.4	98.4	48.5	98.6	48.8	99.0	49.3	99.6	58
59	49.2	99.2	49.2	99.2	49.3	99.4	49.6	99.8	50.1	500.4	59
60	50.0	100.0	150.0	200.1	250.2	300.3	350.4	400.7	450.9	501.3	60
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	10°	11°	12°	13°	14°	15°	16°	17°	18°	M.
0	501.3	551.7	602.2	652.8	703.5	754.3	805.2	856.3	907.5	0
1	02.1	52.5	03.1	53.7	04.4	55.2	06.1	57.2	08.3	1
2	03.0	53.4	03.9	54.5	05.2	56.0	06.9	58.0	09.2	2
3	03.8	54.2	04.7	55.3	06.1	56.9	07.8	58.9	10.1	3
4	04.6	55.1	05.6	56.2	06.9	57.7	08.6	59.7	10.9	4
5	505.5	555.9	606.4	657.0	707.7	758.6	809.5	860.6	911.8	5
6	06.3	56.7	07.3	57.9	08.6	59.4	10.3	61.4	12.6	6
7	07.2	57.6	08.1	58.7	09.4	60.3	11.2	62.3	13.5	7
8	08.0	58.4	09.0	59.6	10.3	61.1	12.0	63.1	14.3	8
9	08.8	59.3	09.8	60.4	11.1	62.0	12.9	64.0	15.2	9
10	509.7	560.1	610.6	661.3	712.0	762.8	813.7	864.8	916.0	10
11	10.5	61.0	11.5	62.1	12.8	63.7	14.6	65.7	16.9	11
12	11.4	61.8	12.3	62.9	13.7	64.5	15.5	66.5	17.7	12
13	12.2	62.6	13.2	63.8	14.5	65.3	16.3	67.4	18.6	13
14	13.0	63.5	14.0	64.6	15.4	66.2	17.2	68.2	19.5	14
15	513.9	564.3	614.9	665.5	716.2	767.0	818.0	869.1	920.3	15
16	14.7	65.2	15.7	66.3	17.1	67.9	18.9	69.9	21.2	16
17	15.6	66.0	16.5	67.2	17.9	68.7	19.7	70.8	22.0	17
18	16.4	66.8	17.4	68.0	18.7	69.6	20.6	71.6	22.9	18
19	17.2	67.7	18.2	68.9	19.6	70.4	21.4	72.5	23.7	19
20	518.1	568.5	619.1	669.7	720.4	771.3	822.3	873.3	924.6	20
21	18.9	69.4	19.9	70.5	21.3	72.1	23.1	74.2	25.4	21
22	19.8	70.2	20.8	71.4	22.1	73.0	24.0	75.1	26.3	22
23	20.6	71.1	21.6	72.2	23.0	73.8	24.8	75.9	27.1	23
24	21.4	71.9	22.4	73.1	23.8	74.7	25.7	76.8	28.0	24
25	522.3	572.7	623.3	673.9	724.7	775.5	826.5	877.6	928.9	25
26	23.1	73.6	24.1	74.8	25.5	76.4	27.4	78.5	29.7	26
27	24.0	74.4	25.0	75.6	26.4	77.2	28.2	79.3	30.6	27
28	24.8	75.3	25.8	76.5	27.2	78.1	29.1	80.2	31.4	28
29	25.6	76.1	26.7	77.3	28.1	78.9	29.9	81.0	32.3	29
30	526.5	576.9	627.5	678.1	728.9	779.8	830.8	881.9	933.1	30
31	27.3	77.8	28.4	79.0	29.8	80.6	31.6	82.7	34.0	31
32	28.2	78.6	29.2	79.8	30.6	81.5	32.5	83.6	34.8	32
33	29.0	79.5	30.0	80.7	31.4	82.3	33.3	84.4	35.7	33
34	29.9	80.3	30.9	81.5	32.3	83.2	34.2	85.3	36.6	34
35	530.7	581.2	631.7	682.4	733.1	784.0	835.0	886.1	937.4	35
36	31.5	82.0	32.6	83.2	34.0	84.9	35.9	87.0	38.3	36
37	32.4	82.8	33.4	84.1	34.8	85.7	36.7	87.9	39.1	37
38	33.2	83.7	34.2	84.9	35.7	86.6	37.6	88.7	40.0	38
39	34.1	84.5	35.1	85.8	36.5	87.4	38.4	89.6	40.8	39
40	534.9	585.4	635.9	686.6	737.4	788.3	839.3	890.4	941.7	40
41	35.7	86.2	36.8	87.4	38.2	89.1	40.1	91.3	42.5	41
42	36.6	87.0	37.6	88.3	39.1	90.0	41.0	92.1	43.4	42
43	37.4	87.9	38.5	89.1	39.9	90.8	41.8	93.0	44.3	43
44	38.2	88.7	39.3	90.0	40.8	91.7	42.7	93.8	45.1	44
45	539.1	589.6	640.2	690.8	741.6	792.5	843.5	894.7	946.0	45
46	39.9	90.4	41.0	91.7	42.5	93.4	44.4	95.5	46.8	46
47	40.8	91.3	41.8	92.5	43.3	94.2	45.2	96.4	47.7	47
48	41.6	92.1	42.7	93.4	44.2	95.1	46.1	97.2	48.5	48
49	42.5	92.9	43.5	94.2	45.0	95.9	46.9	98.1	49.4	49
50	543.3	593.8	644.4	695.1	745.8	796.8	847.8	898.9	950.2	50
51	44.1	94.6	45.2	95.9	46.7	97.6	48.6	99.8	51.1	51
52	45.0	95.5	46.1	96.7	47.5	98.5	49.5	900.7	52.0	52
53	45.8	96.3	46.9	97.6	48.4	99.3	50.3	01.5	52.8	53
54	46.7	97.2	47.7	98.4	49.2	800.2	51.2	02.4	53.7	54
55	547.5	598.0	648.6	699.3	750.1	801.0	852.0	903.2	954.5	55
56	48.3	98.8	49.4	700.1	50.9	01.9	52.9	04.1	55.4	56
57	49.2	99.7	50.3	01.0	51.8	02.7	53.7	04.9	56.2	57
58	50.0	600.5	51.1	01.8	52.6	03.6	54.6	05.8	57.1	58
59	50.9	01.4	52.0	02.7	53.5	04.4	55.5	06.6	58.0	59
60	551.7	602.2	652.8	703.5	754.3	805.2	856.3	907.5	958.8	60
	10°	11°	12°	13°	14°	15°	16°	17°	18°	

TABLE III.—TANGENT DISTANCES F [illegible] CURVE.

M.	19°	20°	21°	22°	23°	24°	25°	26°	M.
0	958.8	1010.3	1061.9	1113.7	1165.7	1217.9	1270.2	1322.8	0
1	59.7	11.2	62.8	14.6	66.6	18.7	71.1	23.7	1
2	60.5	12.0	63.7	15.5	67.4	19.6	72.0	24.5	2
3	61.4	12.9	64.5	16.3	68.3	20.5	72.9	25.4	3
4	62.2	13.7	65.4	17.2	69.2	21.4	73.7	26.3	4
5	963.1	1014.6	1066.2	1118.1	1170.1	1222.2	1274.6	1327.2	5
6	64.0	15.4	67.1	18.9	70.9	23.1	75.5	28.1	6
7	64.8	16.3	68.0	19.8	71.8	24.0	76.4	28.9	7
8	65.7	17.2	68.8	20.7	72.7	24.8	77.2	29.8	8
9	66.5	18.0	69.7	21.5	73.5	25.7	78.1	30.7	9
10	967.4	1018.9	1070.6	1122.4	1174.4	1226.6	1279.0	1331.6	10
11	68.2	19.8	71.4	23.2	75.3	27.5	79.9	32.5	11
12	69.1	20.6	72.3	24.1	76.1	28.3	80.7	33.3	12
13	70.0	21.5	73.1	25.0	77.0	29.2	81.6	34.2	13
14	70.8	22.3	74.0	25.8	77.9	30.1	82.5	35.1	14
15	971.7	1023.2	1074.9	1126.7	1178.7	1230.9	1283.4	1336.0	15
16	72.5	24.0	75.7	27.6	79.6	31.8	84.2	36.8	16
17	73.4	24.9	76.6	28.4	80.5	32.7	85.1	37.7	17
18	74.2	25.8	77.5	29.3	81.3	33.6	86.0	38.6	18
19	75.1	26.6	78.3	30.2	82.2	34.4	86.9	39.5	19
20	976.0	1027.5	1079.2	1131.0	1183.1	1235.3	1287.7	1340.4	20
21	76.8	28.3	80.0	31.9	83.9	36.2	88.6	41.2	21
22	77.7	29.2	80.9	32.8	84.8	37.0	89.5	42.1	22
23	78.5	30.1	81.8	33.6	85.7	37.9	90.4	43.0	23
24	79.4	30.9	82.6	34.5	86.6	38.8	91.2	43.9	24
25	980.2	1031.8	1083.5	1135.4	1187.4	1239.7	1292.1	1344.8	25
26	81.1	32.6	84.4	36.2	88.3	40.5	93.0	45.6	26
27	82.0	33.5	85.2	37.1	89.2	41.4	93.9	46.5	27
28	82.8	34.4	86.1	38.0	90.0	42.4	94.7	47.4	28
29	83.7	35.2	86.9	38.8	90.9	43.2	95.6	48.3	29
30	984.5	1036.1	1087.8	1139.7	1191.8	1244.0	1296.5	1349.2	30
31	85.4	37.0	88.7	40.6	92.6	44.9	97.4	50.0	31
32	86.3	37.8	89.5	41.4	93.5	45.8	98.2	50.9	32
33	87.1	38.7	90.4	42.3	94.4	46.6	99.1	51.8	33
34	88.0	39.5	91.3	43.2	95.2	47.5	1300.0	52.7	34
35	988.8	1040.4	1092.1	1144.0	1196.1	1248.4	1300.9	1353.6	35
36	89.7	41.3	93.0	44.9	97.0	49.3	01.7	54.4	36
37	90.5	42.1	93.9	45.8	97.9	50.1	02.6	55.3	37
38	91.4	43.0	94.7	46.6	98.7	51.0	03.5	56.2	38
39	92.3	43.8	95.6	47.5	99.6	51.9	04.4	57.1	39
40	993.1	1044.7	1096.4	1148.4	1200.5	1252.8	1305.3	1358.0	40
41	94.0	45.6	97.3	49.2	01.3	53.6	06.1	58.8	41
42	94.8	46.4	98.2	50.1	02.2	54.5	07.0	59.7	42
43	95.7	47.3	99.0	51.0	03.1	55.4	07.9	60.6	43
44	96.5	48.1	99.9	51.8	03.9	56.3	08.8	61.5	44
45	997.4	1049.0	1100.8	1152.7	1204.8	1257.1	1309.6	1362.4	45
46	98.3	49.9	01.6	53.6	05.7	58.0	10.5	63.2	46
47	99.1	50.7	02.5	54.4	06.6	58.9	11.4	64.1	47
48	1000.0	51.6	03.4	55.3	07.4	59.7	12.3	65.0	48
49	00.8	52.4	04.2	56.2	08.3	60.6	13.1	65.9	49
50	1001.7	1053.3	1105.1	1157.0	1209.2	1261.5	1314.0	1366.8	50
51	02.6	54.2	05.9	57.9	10.0	62.4	14.9	67.6	51
52	03.4	55.0	06.8	58.8	10.9	63.2	15.8	68.5	52
53	04.3	55.9	07.7	59.6	11.8	64.1	16.7	69.4	53
54	05.1	56.8	08.5	60.5	12.7	65.0	17.5	70.3	54
55	1006.0	1057.6	1109.4	1161.4	1213.5	1265.9	1318.4	1371.2	55
56	06.9	58.5	10.3	62.2	14.4	66.7	19.3	72.0	56
57	07.7	59.3	11.1	63.1	15.3	67.6	20.2	72.9	57
58	08.6	60.2	12.0	64.0	16.1	68.5	21.0	73.8	58
59	09.4	61.1	12.9	64.8	17.0	69.4	21.9	74.7	59
60	1010.3	1061.9	1113.7	1165.7	1217.9	1270.2	1322.8	1375.6	60
	19°	20°	21°	22°	23°	24°	25°	26°	

TAB[illegible]NT DISTANCES FOR A 1° CURVE.

M.	27°	28°	29°	30°	31°	32°	33°	34°	M.
0	1375.6	1428.6	1481.8	1535.3	1589.0	1643.0	1697.2	1751.7	0
1	76.4	29.4	82.7	36.1	89.9	43.9	98.1	52.6	1
2	77.3	30.3	83.6	37.0	90.8	44.8	99.0	53.6	2
3	78.2	31.2	84.5	37.9	91.7	45.7	99.9	54.5	3
4	79.1	32.1	85.3	38.8	92.6	46.6	1700.8	55.4	4
5	1380.0	1433.0	1486.2	1539.7	1593.5	1647.5	1701.7	1756.3	5
6	80.9	33.9	87.1	40.6	94.4	48.4	02.6	57.2	6
7	81.7	34.8	88.0	41.5	95.3	49.3	03.5	58.1	7
8	82.6	35.6	88.9	42.4	96.2	50.2	04.5	59.0	8
9	83.5	36.5	89.8	43.3	97.1	51.1	05.4	59.9	9
10	1384.4	1437.4	1490.7	1544.2	1598.0	1652.0	1706.3	1760.8	10
11	85.3	38.3	91.6	45.1	98.8	52.9	07.2	61.8	11
12	86.1	39.2	92.5	46.0	99.7	53.8	08.1	62.7	12
13	87.0	40.1	93.4	46.9	1600.6	54.7	09.0	63.6	13
14	87.9	41.0	94.2	47.8	01.5	55.6	09.9	64.5	14
15	1388.8	1441.8	1495.1	1548.7	1602.4	1656.5	1710.8	1765.4	15
16	89.7	42.7	96.0	49.6	03.3	57.4	11.7	66.3	16
17	90.6	43.6	96.9	50.4	04.2	58.3	12.6	67.2	17
18	91.4	44.5	97.8	51.3	05.1	59.2	13.5	68.1	18
19	92.3	45.4	98.7	52.2	06.0	60.1	14.4	69.1	19
20	1393.2	1446.3	1499.6	1553.1	1606.9	1661.0	1715.3	1770.0	20
21	94.1	47.2	1500.5	54.0	07.8	61.9	16.3	70.9	21
22	95.0	48.1	01.4	54.9	08.7	62.8	17.2	71.8	22
23	95.9	48.9	02.3	55.8	09.6	63.7	18.1	72.7	23
24	96.7	49.8	03.1	56.7	10.5	64.6	19.0	73.6	24
25	1397.6	1450.7	1504.0	1557.6	1611.4	1665.5	1719.9	1774.5	25
26	98.5	51.6	04.9	58.5	12.3	66.4	20.8	75.4	26
27	99.4	52.5	05.8	59.4	13.2	67.3	21.7	76.4	27
28	1400.3	53.4	06.7	60.3	14.1	68.2	22.6	77.3	28
29	01.2	54.3	07.6	61.2	15.0	69.1	23.5	78.2	29
30	1402.0	1455.1	1508.5	1562.1	1615.9	1670.0	1724.4	1779.1	30
31	02.9	56.0	09.4	63.0	16.8	70.9	25.3	80.0	31
32	03.8	56.9	10.3	63.9	17.7	71.8	26.2	80.9	32
33	04.7	57.8	11.2	64.8	18.6	72.8	27.2	81.8	33
34	05.6	58.7	12.1	65.7	19.5	73.7	28.1	82.8	34
35	1406.5	1459.6	1512.9	1566.6	1620.4	1674.6	1729.0	1783.7	35
36	07.3	60.5	13.8	67.5	21.3	75.5	29.9	84.6	36
37	08.2	61.4	14.7	68.4	22.2	76.4	30.8	85.5	37
38	09.1	62.2	15.6	69.2	23.1	77.3	31.7	86.4	38
39	10.0	63.1	16.5	70.1	24.0	78.2	32.6	87.3	39
40	1410.9	1464.0	1517.4	1571.0	1624.9	1679.1	1733.5	1788.2	40
41	11.8	64.9	18.3	71.9	25.8	80.0	34.4	89.2	41
42	12.6	65.8	19.2	72.8	26.7	80.9	35.3	90.1	42
43	13.5	66.7	20.1	73.7	27.6	81.8	36.3	91.0	43
44	14.4	67.6	21.0	74.6	28.5	82.7	37.2	91.9	44
45	1415.3	1468.5	1521.9	1575.5	1629.4	1683.6	1738.1	1792.8	45
46	16.2	69.3	22.8	76.4	30.3	84.5	39.0	93.7	46
47	17.1	70.2	23.6	77.3	31.2	85.4	39.9	94.6	47
48	17.9	71.1	24.5	78.2	32.1	86.3	40.8	95.6	48
49	18.8	72.0	25.4	79.1	33.0	87.2	41.7	96.5	49
50	1419.7	1472.9	1526.3	1580.0	1633.9	1688.1	1742.6	1797.4	50
51	20.6	73.8	27.2	80.9	34.8	89.1	43.5	98.3	51
52	21.5	74.7	28.1	81.8	35.7	90.0	44.4	99.2	52
53	22.4	75.6	29.0	82.7	36.6	90.9	45.4	1800.1	53
54	23.3	76.5	29.9	83.6	37.5	91.8	46.3	01.1	54
55	1424.1	1477.3	1530.8	1584.5	1638.4	1692.7	1747.2	1802.0	55
56	25.0	78.2	31.7	85.4	39.3	93.6	48.1	02.9	56
57	25.9	79.1	32.6	86.3	40.2	94.5	49.0	03.8	57
58	26.8	80.0	33.5	87.2	41.1	95.4	49.9	04.7	58
59	27.7	80.9	34.4	88.1	42.0	96.3	50.8	05.6	59
60	1428.6	1481.8	1535.3	1589.0	1643.0	1697.2	1751.7	1806.6	60
	27°	28°	29°	30°	31°	32°	33°	34°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	35°	36°	37°	38°	39°	40°	41°	42°	M.
0	1806.6	1861.7	1917.1	1972.9	2029.0	2085.4	2142.2	2199.4	0
1	07.5	62.6	18.0	73.8	29.9	86.4	43.2	2200.4	1
2	08.4	63.5	19.0	74.7	30.9	87.3	44.1	01.3	2
3	09.3	64.4	19.9	75.7	31.8	88.3	45.1	02.3	3
4	10.2	65.4	20.8	76.6	32.7	89.2	46.0	03.2	4
5	1811.1	1866.3	1921.7	1977.5	2033.7	2090.1	2147.0	2204.2	5
6	12.1	67.2	22.7	78.5	34.6	91.1	47.9	05.1	6
7	13.0	68.1	23.6	79.4	35.5	92.0	48.9	06.1	7
8	13.9	69.0	24.5	80.3	36.5	93.0	49.8	07.1	8
9	14.8	70.0	25.5	81.3	37.4	93.9	50.8	08.0	9
16	1815.7	1870.9	1926.4	1982.2	2038.4	2094.9	2151.7	2209.0	10
11	16.6	71.8	27.3	83.1	39.3	95.8	52.7	09.9	11
12	17.6	72.7	28.2	84.1	40.2	96.8	53.6	10.9	12
13	18.5	73.7	29.2	85.0	41.2	97.7	54.6	11.8	13
14	19.4	74.6	30.1	85.9	42.1	98.6	55.5	12.8	14
15	1820.3	1875.5	1931.0	1986.9	2043.1	2099.6	2156.5	2213.8	15
16	21.2	76.4	32.0	87.8	44.0	2100.5	57.4	14.7	16
17	22.1	77.4	32.9	88.7	44.9	01.5	58.4	15.7	17
18	23.1	78.3	33.8	89.7	45.9	02.4	59.3	16.6	18
19	24.0	79.2	34.7	90.6	46.8	03.4	60.3	17.6	19
20	1824.9	1880.1	1935.7	1991.5	2047.8	2104.3	2161.2	2218.6	20
21	25.8	81.0	36.6	92.5	48.7	05.3	62.2	19.5	21
22	26.7	82.0	37.5	93.4	49.6	06.2	63.2	20.5	22
23	27.6	82.9	38.5	94.3	50.6	07.2	64.1	21.4	23
24	28.6	83.8	39.4	95.3	51.5	08.1	65.1	22.4	24
25	1829.5	1884.7	1940.3	1996.2	2052.5	2109.0	2166.0	2223.3	25
26	30.4	85.7	41.2	97.1	53.4	10.0	67.0	24.3	26
27	31.3	86.6	42.2	98.1	54.3	10.9	67.9	25.3	27
28	32.2	87.5	43.1	99.0	55.3	11.9	68.9	26.2	28
29	33.2	88.4	44.0	99.9	56.2	12.8	69.8	27.2	29
30	1834.1	1889.4	1945.0	2000.9	2057.2	2113.8	2170.8	2228.1	30
31	35.0	90.3	45.9	01.8	58.1	14.7	71.7	29.1	31
32	35.9	91.2	46.8	02.8	59.0	15.7	72.7	30.1	32
33	36.8	92.1	47.7	03.7	60.0	16.6	73.6	31.0	33
34	37.8	93.1	48.7	04.6	60.9	17.6	74.6	32.0	34
35	1838.7	1894.0	1949.6	2005.6	2061.9	2118.5	2175.5	2232.9	35
36	39.6	94.9	50.5	06.5	62.8	19.5	76.5	33.9	36
37	40.5	95.8	51.5	07.4	63.7	20.4	77.4	34.9	37
38	41.4	96.7	52.4	08.4	64.7	21.4	78.4	35.8	38
39	42.4	97.7	53.3	09.3	65.6	22.3	79.4	36.8	39
40	1843.3	1898.6	1954.3	2010.2	2066.6	2123.3	2180.3	2237.7	40
41	44.2	99.5	55.2	11.2	67.5	24.2	81.3	38.7	41
42	45.1	1900.4	56.1	12.1	68.5	25.1	82.2	39.7	42
43	46.0	01.4	57.0	13.0	69.4	26.1	83.2	40.6	43
44	47.0	02.3	58.0	14.0	70.3	27.0	84.1	41.6	44
45	1847.9	1903.2	1958.9	2014.9	2071.3	2128.0	2185.1	2242.5	45
46	48.8	04.2	59.8	15.9	72.2	28.9	86.0	43.5	46
47	49.7	05.1	60.8	16.8	73.2	29.9	87.0	44.5	47
48	50.6	06.0	61.7	17.7	74.1	30.8	87.9	45.4	48
49	51.5	06.9	62.6	18.7	75.0	31.8	88.9	46.4	49
50	1852.5	1907.9	1963.6	2019.6	2076.0	2132.7	2189.9	2247.3	50
51	53.4	08.8	64.5	20.5	76.9	33.7	90.8	48.3	51
52	54.3	09.7	65.4	21.5	77.9	34.6	91.8	49.3	52
53	55.2	10.6	66.4	22.4	78.8	35.6	92.7	50.2	53
54	56.2	11.6	67.3	23.4	79.8	36.5	93.7	51.2	54
55	1857.1	1912.5	1968.2	2024.3	2080.7	2137.5	2194.6	2252.2	55
56	58.0	13.4	69.1	25.2	81.6	38.4	95.6	53.1	56
57	58.9	14.3	70.1	26.2	82.6	39.4	96.5	54.1	57
58	59.8	15.3	71.0	27.1	83.5	40.3	97.5	55.0	58
59	60.8	16.2	71.9	28.0	84.5	41.3	98.5	56.0	59
60	1861.7	1917.1	1972.9	2029.0	2085.4	2142.2	2199.4	2257.0	60
	35°	36°	37°	38°	39°	40°	41°	42°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	43°	44°	45°	46°	47°	48°	49°	50°	M.
0	2257.0	2314.9	2373.3	2432.1	2491.3	2551.0	2611.2	2671.8	0
1	57.9	15.9	74.3	33.1	92.3	52.0	12.2	72.8	1
2	58.9	16.9	75.3	34.1	93.3	53.0	13.2	73.8	2
3	59.9	17.8	76.2	35.0	94.3	54.0	14.2	74.8	3
4	60.8	18.8	77.2	36.0	95.3	55.0	15.2	75.8	4
5	2261.8	2319.8	2378.2	2437.0	2496.3	2556.0	2616.2	2676.9	5
6	62.7	20.7	79.2	38.0	97.3	57.0	17.2	77.9	6
7	63.7	21.7	80.1	39.0	98.3	58.0	18.2	78.9	7
8	64.7	22.7	81.1	40.0	99.3	59.0	19.2	79.9	8
9	65.6	23.7	82.1	40.9	2500.2	60.0	20.2	80.9	9
10	2266.6	2324.6	2383.1	2441.9	2501.2	2561.0	2621.2	2681.9	10
11	67.6	25.6	84.0	42.9	02.2	62.0	22.2	82.9	11
12	68.5	26.6	85.0	43.9	03.2	63.0	23.2	84.0	12
13	69.5	27.5	86.0	44.9	04.2	64.0	24.2	85.0	13
14	70.5	28.5	87.0	45.9	05.2	65.0	25.3	86.0	14
15	2271.4	2329.5	2388.0	2446.9	2506.2	2566.0	2626.3	2687.0	15
16	72.4	30.5	88.9	47.8	07.2	67.0	27.3	88.0	16
17	73.4	31.4	89.9	48.8	08.2	68.0	28.3	89.0	17
18	74.3	32.4	90.9	49.8	09.2	69.0	29.3	90.1	18
19	75.3	33.4	91.9	50.8	10.2	70.0	30.3	91.1	19
20	2276.2	2334.3	2392.8	2451.8	2511.2	2571.0	2631.3	2692.1	20
21	77.2	35.3	93.8	52.8	12.2	72.0	32.3	93.1	21
22	78.2	36.3	94.8	53.8	13.2	73.0	33.3	94.1	22
23	79.1	37.3	95.8	54.7	14.1	74.0	34.3	95.2	23
24	80.1	38.2	96.8	55.7	15.1	75.0	35.3	96.2	24
25	2281.1	2339.2	2397.7	2456.7	2516.1	2576.0	2636.4	2697.2	25
26	82.0	40.2	98.7	57.7	17.1	77.0	37.4	98.2	26
27	83.0	41.1	99.7	58.7	18.1	78.0	38.4	99.2	27
28	84.0	42.1	2400.7	59.7	19.1	79.0	39.4	2700.2	28
29	84.9	43.1	01.7	60.7	20.1	80.0	40.4	01.3	29
30	2285.9	2344.1	2402.6	2461.7	2521.1	2581.0	2641.4	2702.3	30
31	86.9	45.0	03.6	62.6	22.1	82.0	42.4	03.3	31
32	87.8	46.0	04.6	63.6	23.1	83.0	43.4	04.3	32
33	88.8	47.0	05.6	64.6	24.1	84.0	44.4	05.3	33
34	89.8	48.0	06.6	65.6	25.1	85.0	45.4	06.4	34
35	2290.7	2348.9	2407.5	2466.6	2526.1	2586.0	2646.5	2707.4	35
36	91.7	49.9	08.5	67.6	27.1	87.0	47.5	08.4	36
37	92.7	50.9	09.5	68.6	28.1	88.0	48.5	09.4	37
38	93.6	51.8	10.5	69.6	29.1	89.0	49.5	10.4	38
39	94.6	52.8	11.5	70.5	30.1	90.0	50.5	11.5	39
40	2295.6	2353.8	2412.4	2471.5	2531.1	2591.1	2651.5	2712.5	40
41	96.5	54.8	13.4	72.5	32.1	92.1	52.5	13.5	41
42	97.5	55.7	14.4	73.5	33.1	93.1	53.5	14.5	42
43	98.5	56.7	15.4	74.5	34.1	94.1	54.6	15.5	43
44	99.4	57.7	16.4	75.5	35.0	95.1	55.6	16.6	44
45	2300.4	2358.7	2417.4	2476.5	2536.0	2596.1	2656.6	2717.6	45
46	01.4	59.6	18.3	77.5	37.0	97.1	57.6	18.6	46
47	02.3	60.6	19.3	78.5	38.0	98.1	58.6	19.6	47
48	03.3	61.6	20.3	79.4	39.0	99.1	59.6	20.6	48
49	04.3	62.6	21.3	80.4	40.0	2600.1	60.6	21.7	49
50	2305.2	2363.5	2422.3	2481.4	2541.0	2601.1	2661.6	2722.7	50
51	06.2	64.5	23.2	82.4	42.0	02.1	62.7	23.7	51
52	07.2	65.5	24.2	83.4	43.0	03.1	63.7	24.7	52
53	08.1	66.5	25.2	84.4	44.0	04.1	64.7	25.7	53
54	09.1	67.4	26.2	85.4	45.0	05.1	65.7	26.8	54
55	2310.1	2368.4	2427.2	2486.4	2546.0	2606.1	2666.7	2727.8	55
56	11.1	69.4	28.2	87.4	47.0	07.1	67.7	28.8	56
57	12.0	70.4	29.1	88.4	48.0	08.1	68.7	29.8	57
58	13.0	71.3	30.1	89.3	49.0	09.1	69.8	30.9	58
59	14.0	72.3	31.1	90.3	50.0	10.1	70.8	31.9	59
60	2314.9	2373.3	2432.1	2491.3	2551.0	2611.2	2671.8	2732.9	60
	43°	44°	45°	46°	47°	48°	49°	50°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	35°	36°	37°	38°	39°	40°	41°	42°	M.
0	1806.6	1861.7	1917.1	1972.9	2029.0	2085.4	2142.2	2199.4	0
1	07.5	62.6	18.0	73.8	29.9	86.4	43.2	2200.4	1
2	08.4	63.5	19.0	74.7	30.9	87.3	44.1	01.3	2
3	09.3	64.4	19.9	75.7	31.8	88.3	45.1	02.3	3
4	10.2	65.4	20.8	76.6	32.7	89.2	46.0	03.2	4
5	1811.1	1866.3	1921.7	1977.5	2033.7	2090.1	2147.0	2204.2	5
6	12.1	67.2	22.7	78.5	34.6	91.1	47.9	05.1	6
7	13.0	68.1	23.6	79.4	35.5	92.0	48.9	06.1	7
8	13.9	69.0	24.5	80.3	36.5	93.0	49.8	07.1	8
9	14.8	70.0	25.5	81.3	37.4	93.9	50.8	08.0	9
16	1815.7	1870.9	1926.4	1982.2	2038.4	2094.9	2151.7	2209.0	10
11	16.6	71.8	27.3	83.1	39.3	95.8	52.7	09.9	11
12	17.6	72.7	28.2	84.1	40.2	96.8	53.6	10.9	12
13	18.5	73.7	29.2	85.0	41.2	97.7	54.6	11.8	13
14	19.4	74.6	30.1	85.9	42.1	98.6	55.5	12.8	14
15	1820.3	1875.5	1931.0	1986.9	2043.1	2099.6	2156.5	2213.8	15
16	21.2	76.4	32.0	87.8	44.0	2100.5	57.4	14.7	16
17	22.1	77.4	32.9	88.7	44.9	01.5	58.4	15.7	17
18	23.1	78.3	33.8	89.7	45.9	02.4	59.3	16.6	18
19	24.0	79.2	34.7	90.6	46.8	03.4	60.3	17.6	19
20	1824.9	1880.1	1935.7	1991.5	2047.8	2104.3	2161.2	2218.6	20
21	25.8	81.0	36.6	92.5	48.7	05.3	62.2	19.5	21
22	26.7	82.0	37.5	93.4	49.6	06.2	63.2	20.5	22
23	27.6	82.9	38.5	94.3	50.6	07.2	64.1	21.4	23
24	28.6	83.8	39.4	95.3	51.5	08.1	65.1	22.4	24
25	1829.5	1884.7	1940.3	1996.2	2052.5	2109.0	2166.0	2223.3	25
26	30.4	85.7	41.2	97.1	53.4	10.0	67.0	24.3	26
27	31.3	86.6	42.2	98.1	54.3	10.9	67.9	25.3	27
28	32.2	87.5	43.1	99.0	55.3	11.9	68.9	26.2	28
29	33.2	88.4	44.0	99.9	56.2	12.8	69.8	27.2	29
30	1834.1	1889.4	1945.0	2000.9	2057.2	2113.8	2170.8	2228.1	30
31	35.0	90.3	45.9	01.8	58.1	14.7	71.7	29.1	31
32	35.9	91.2	46.8	02.8	59.0	15.7	72.7	30.1	32
33	36.8	92.1	47.7	03.7	60.0	16.6	73.6	31.0	33
34	37.8	93.1	48.7	04.6	60.9	17.6	74.6	32.0	34
35	1838.7	1894.0	1949.6	2005.6	2061.9	2118.5	2175.5	2232.9	35
36	39.6	94.9	50.5	06.5	62.8	19.5	76.5	33.9	36
37	40.5	95.8	51.5	07.4	63.7	20.4	77.4	34.9	37
38	41.4	96.7	52.4	08.4	64.7	21.4	78.4	35.8	38
39	42.4	97.7	53.3	09.3	65.6	22.3	79.4	36.8	39
40	1843.3	1898.6	1954.3	2010.2	2066.6	2123.3	2180.3	2237.7	40
41	44.2	99.5	55.2	11.2	67.5	24.2	81.3	38.7	41
42	45.1	1900.4	56.1	12.1	68.5	25.1	82.2	39.7	42
43	46.0	01.4	57.0	13.0	69.4	26.1	83.2	40.6	43
44	47.0	02.3	58.0	14.0	70.3	27.0	84.1	41.6	44
45	1847.9	1903.2	1958.9	2014.9	2071.3	2128.0	2185.1	2242.5	45
46	48.8	04.2	59.8	15.9	72.2	28.9	86.0	43.5	46
47	49.7	05.1	60.8	16.8	73.2	29.9	87.0	44.5	47
48	50.6	06.0	61.7	17.7	74.1	30.8	87.9	45.4	48
49	51.5	06.9	62.6	18.7	75.0	31.8	88.9	46.4	
50	1852.5	1907.9	1963.6	2019.6	2076.0	2132.7	2189.9	2247.3	
51	53.4	08.8	64.5	20.5	76.9	33.7	90.8	48.3	
52	54.3	09.7	65.4	21.5	77.9	34.6	91.8	49.3	
53	55.2	10.6	66.4	22.4	78.8	35.6	92.7	50.2	
54	56.2	11.6	67.3	23.4	79.8	36.5	93.7	51.2	
55	1857.1	1912.5	1968.2	2024.3	2080.7	2137.5	2194.6	2252.2	
56	58.0	13.4	69.1	25.2	81.6	38.4	95.6	53.1	
57	58.9	14.3	70.1	26.2	82.6	39.4	96.5	54.1	
58	59.8	15.3	71.0	27.1	83.5	40.3	97.5	55.0	
59	60.8	16.2	71.9	28.0	84.5	41.3	98.5	56.0	
60	1861.7	1917.1	1972.9	2029.0	2085.4	2142.2	2199.4	2257.0	
	35°	36°	37°	38°	39°	40°	41°	42°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	43°	44°	45°	46°	47°	48°	49°	50°	M.
0	2257.0	2314.9	2373.3	2432.1	2491.3	2551.0	2611.2	2671.8	0
1	57.9	15.9	74.3	33.1	92.3	52.0	12.2	72.8	1
2	58.9	16.9	75.3	34.1	93.3	53.0	13.2	73.8	2
3	59.9	17.8	76.2	35.0	94.3	54.0	14.2	74.8	3
4	60.8	18.8	77.2	36.0	95.3	55.0	15.2	75.8	4
5	2261.8	2319.8	2378.2	2437.0	2496.3	2556.0	2616.2	2676.9	5
6	62.7	20.7	79.2	38.0	97.3	57.0	17.2	77.9	6
7	63.7	21.7	80.1	39.0	98.3	58.0	18.2	78.9	7
8	64.7	22.7	81.1	40.0	99.3	59.0	19.2	79.9	8
9	65.6	23.7	82.1	40.9	2500.2	60.0	20.2	80.9	9
10	2266.6	2324.6	2383.1	2441.9	2501.2	2561.0	2621.2	2681.9	10
11	67.6	25.6	84.0	42.9	02.2	62.0	22.2	82.9	11
12	68.5	26.6	85.0	43.9	03.2	63.0	23.2	84.0	12
13	69.5	27.5	86.0	44.9	04.2	64.0	24.2	85.0	13
14	70.5	28.5	87.0	45.9	05.2	65.0	25.3	86.0	14
15	2271.4	2329.5	2388.0	2446.9	2506.2	2566.0	2626.3	2687.0	15
16	72.4	30.5	88.9	47.8	07.2	67.0	27.3	88.0	16
17	73.4	31.4	89.9	48.8	08.2	68.0	28.3	89.0	17
18	74.3	32.4	90.9	49.8	09.2	69.0	29.3	90.1	18
19	75.3	33.4	91.9	50.8	10.2	70.0	30.3	91.1	19
20	2276.2	2334.3	2392.8	2451.8	2511.2	2571.0	2631.3	2692.1	20
21	77.2	35.3	93.8	52.8	12.2	72.0	32.3	93.1	21
22	78.2	36.3	94.8	53.8	13.2	73.0	33.3	94.1	22
23	79.1	37.3	95.8	54.7	14.1	74.0	34.3	95.2	23
24	80.1	38.2	96.8	55.7	15.1	75.0	35.3	96.2	24
25	2281.1	2339.2	2397.7	2456.7	2516.1	2576.0	2636.4	2697.2	25
26	82.0	40.2	98.7	57.7	17.1	77.0	37.4	98.2	26
27	83.0	41.1	99.7	58.7	18.1	78.0	38.4	99.2	27
28	84.0	42.1	2400.7	59.7	19.1	79.0	39.4	2700.2	28
29	84.9	43.1	01.7	60.7	20.1	80.0	40.4	01.3	29
30	2285.9	2344.1	2402.6	2461.7	2521.1	2581.0	2641.4	2702.3	30
31	86.9	45.0	03.6	62.6	22.1	82.0	42.4	03.3	31
32	87.8	46.0	04.6	63.6	23.1	83.0	43.4	04.3	32
33	88.8	47.0	05.6	64.6	24.1	84.0	44.4	05.3	33
34	89.8	48.0	06.6	65.6	25.1	85.0	45.4	06.4	34
35	2290.7	2348.9	2407.5	2466.6	2526.1	2586.0	2646.5	2707.4	35
36	91.7	49.9	08.5	67.6	27.1	87.0	47.5	08.4	36
37	92.7	50.9	09.5	68.6	28.1	88.0	48.5	09.4	37
38	93.6	51.8	10.5	69.6	29.1	89.0	49.5	10.4	38
39	94.6	52.8	11.5	70.5	30.1	90.0	50.5	11.5	39
40	2295.6	2353.8	2412.4	2471.5	2531.1	2591.1	2651.5	2712.5	40
41	96.5	54.8	13.4	72.5	32.1	92.1	52.5	13.5	41
42	97.5	55.7	14.4	73.5	33.1	93.1	53.5	14.5	42
43	98.5	56.7	15.4	74.5	34.1	94.1	54.6	15.5	43
44	99.4	57.7	16.4	75.5	35.0	95.1	55.6	16.6	44
45	2300.4	2358.7	2417.4	2476.5	2536.0	2596.1	2656.6	2717.6	45
46	01.4	59.6	18.3	77.5	37.0	97.1	57.6	18.6	46
47	02.3	60.6	19.3	78.5	38.0	98.1	58.6	19.6	47
48	03.3	61.6	20.3	79.4	39.0	99.1	59.6	20.6	48
49	04.3	62.6	21.3	80.4	40.0	2600.1	60.6	21.7	49
50	2305.2	2363.5	2422.3	2481.4	2541.0	2601.1	2661.6	2722.7	50
51	06.2	64.5	23.2	82.4	42.0	02.1	62.7	23.7	51
52	07.2	65.5	24.2	83.4	43.0	03.1	63.7	24.7	52
53	08.1	66.5	25.2	84.4	44.0	04.1	64.7	25.7	53
54	09.1	67.4	26.2	85.4	45.0	05.1	65.7	26.8	54
55	2310.1	2368.4	2427.2	2486.4	2546.0	2606.1	2666.7	2727.8	55
56	11.1	69.4	28.2	87.4	47.0	07.1	67.7	28.8	56
57	12.0	70.4	29.1	88.4	48.0	08.1	68.7	29.8	57
58	13.0	71.3	30.1	89.3	49.0	09.1	69.8	30.9	58
59	14.0	72.3	31.1	90.3	50.0	10.1	70.8	31.9	59
60	2314.9	2373.3	2432.1	2491.3	2551.0	2611.2	2671.8	2732.9	60
	43°	44°	45°	46°	47°	48°	49°	50°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	51°	52°	53°	54°	55°	56°	57°	58°	M.
0	2732.9	2794.5	2856.7	2919.4	2982.7	3046.5	3110.9	3176.0	0
1	33.9	95.6	57.7	20.5	83.7	47.6	12.0	77.1	1
2	34.9	96.6	58.8	21.5	84.8	48.6	13.1	78.2	2
3	36.0	97.6	59.8	22.6	85.8	49.7	14.2	79.3	3
4	37.0	98.7	60.9	23.6	86.9	50.8	15.3	80.4	4
5	2738.0	2799.7	2861.9	2924.7	2988.0	3051.9	3116.3	3181.4	5
6	39.0	2800.7	62.9	25.7	89.0	52.9	17.4	82.5	6
7	40.1	01.8	64.0	26.8	90.1	54.0	18.5	83.6	7
8	41.1	02.8	65.0	27.8	91.1	55.1	19.6	84.7	8
9	42.1	03.8	66.1	28.9	92.2	56.1	20.7	85.8	9
10	2743.1	2804.9	2867.1	2929.9	2993.3	3057.2	3121.7	3186.9	10
11	44.2	05.9	68.2	31.0	94.3	58.3	22.8	88.0	11
12	45.2	06.9	69.2	32.0	95.4	59.3	23.9	89.1	12
13	46.2	08.0	70.2	33.1	96.5	60.4	25.0	90.2	13
14	47.2	09.0	71.3	34.1	97.5	61.5	26.1	91.3	14
15	2748.3	2810.0	2872.3	2935.2	2998.6	3062.6	3127.2	3192.4	15
16	49.3	11.1	73.4	36.2	99.6	63.6	28.2	93.5	16
17	50.3	12.1	74.4	37.3	3000.7	64.7	29.3	94.5	17
18	51.3	13.1	75.5	38.3	01.8	65.8	30.4	95.6	18
19	52.4	14.2	76.5	39.4	02.8	66.8	31.5	96.7	19
20	2753.4	2815.2	2877.5	2940.4	3003.9	3067.9	3132.6	3197.8	20
21	54.4	16.2	78.6	41.5	04.9	69.0	33.6	98.9	21
22	55.4	17.3	79.6	42.5	06.0	70.1	34.7	3200.0	22
23	56.5	18.3	80.7	43.6	07.1	71.1	35.8	01.1	23
24	57.5	19.3	81.7	44.6	08.1	72.2	36.9	02.2	24
25	2758.5	2820.4	2882.8	2945.7	3009.2	3073.3	3138.0	3203.3	25
26	59.5	21.4	83.8	46.7	10.3	74.4	39.1	04.4	26
27	60.6	22.4	84.8	47.8	11.3	75.4	40.1	05.5	27
28	61.6	23.5	85.9	48.9	12.4	76.5	41.2	06.6	28
29	62.6	24.5	86.9	49.9	13.5	77.6	42.3	07.7	29
30	2763.7	2825.6	2888.0	2951.0	3014.5	3078.7	3143.4	3208.8	30
31	64.7	26.6	89.0	52.0	15.6	79.7	44.5	09.9	31
32	65.7	27.6	90.1	53.1	16.6	80.8	45.6	10.9	32
33	66.7	28.7	91.1	54.1	17.7	81.9	46.6	12.0	33
34	67.8	29.7	92.2	55.2	18.8	82.9	47.7	13.1	34
35	2768.8	2830.7	2893.2	2956.2	3019.8	3084.0	3148.8	3214.2	35
36	69.8	31.8	94.3	57.3	20.9	85.1	49.9	15.3	36
37	70.8	32.8	95.3	58.3	22.0	86.2	51.0	16.4	37
38	71.9	33.8	96.4	59.4	23.0	87.2	52.1	17.5	38
39	72.9	34.9	97.4	60.5	24.1	88.3	53.2	18.6	39
40	2773.9	2835.9	2898.4	2961.5	3025.2	3089.4	3154.2	3219.7	40
41	75.0	37.0	99.5	62.6	26.2	90.5	55.3	20.8	41
42	76.0	38.0	2900.5	63.6	27.3	91.6	56.4	21.9	42
43	77.0	39.0	01.6	64.7	28.4	92.6	57.5	23.0	43
44	78.1	40.1	02.6	65.7	29.4	93.7	58.6	24.1	44
45	2779.1	2841.1	2903.7	2966.8	3030.5	3094.8	3159.7	3225.2	45
46	80.1	42.1	04.7	67.9	31.6	95.9	60.8	26.3	46
47	81.1	43.2	05.8	68.9	32.6	96.9	61.8	27.4	47
48	82.2	44.2	06.8	70.0	33.7	98.0	62.9	28.5	48
49	83.2	45.3	07.9	71.0	34.8	99.1	64.0	29.6	49
50	2784.2	2846.3	2908.9	2972.1	3035.8	3100.2	3165.1	3230.7	50
51	85.3	47.3	10.0	73.1	36.9	01.2	66.2	31.8	51
52	86.3	48.4	11.0	74.2	38.0	02.3	67.3	32.9	52
53	87.3	49.4	12.1	75.3	39.0	03.4	68.4	34.0	53
54	88.4	50.5	13.1	76.3	40.1	04.5	69.5	35.1	54
55	2789.4	2851.5	2914.2	2977.4	3041.2	3105.6	3170.6	3236.2	55
56	90.4	52.5	15.2	78.4	42.2	06.6	71.6	37.3	56
57	91.4	53.6	16.3	79.5	43.3	07.7	72.7	38.4	57
58	92.5	54.6	17.3	80.5	44.4	08.8	73.8	39.5	58
59	93.5	55.7	18.4	81.6	45.4	09.9	74.9	40.6	59
60	2794.5	2856.7	2919.4	2982.7	3046.5	3110.9	3176.0	3241.7	60
	51°	52°	53°	54°	55°	56°	57°	58°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	59°	60°	61°	62°	63°	64°	65°	66°	M.
0	3241.7	3308.0	3375.0	3442.7	3511.1	3580.3	3650.2	3720.9	0
1	42.8	09.1	76.1	43.9	12.3	81.4	51.4	22.1	1
2	43.9	10.2	77.3	45.0	13.4	82.6	52.5	23.2	2
3	45.0	11.3	78.4	46.1	14.6	83.8	53.7	24.4	3
4	46.1	12.5	79.5	47.3	15.7	84.9	54.9	25.6	4
5	3247.2	3313.6	3380.6	3448.4	3516.9	3586.1	3656.1	3726.8	5
6	48.3	14.7	81.8	49.5	18.0	87.2	57.2	28.0	6
7	49.4	15.8	82.9	50.7	19.2	88.4	58.4	29.2	7
8	50.5	16.9	84.0	51.8	20.3	89.6	59.6	30.4	8
9	51.6	18.0	85.1	52.9	21.5	90.7	60.7	31.6	9
10	3252.7	3319.1	3386.3	3454.1	3522.6	3591.9	3661.9	3732.7	10
11	53.8	20.2	87.4	55.2	23.8	93.0	63.1	33.9	11
12	54.9	21.4	88.5	56.3	24.9	94.2	64.3	35.1	12
13	56.0	22.5	89.6	57.5	26.1	95.4	65.4	36.3	13
14	57.1	23.6	90.8	58.6	27.2	96.5	66.6	37.5	14
15	3258.2	3324.7	3391.9	3459.8	3528.4	3597.7	3667.8	3738.7	15
16	59.3	25.8	93.0	60.9	29.5	98.8	69.0	39.9	16
17	60.4	26.9	94.1	62.0	30.7	3600.0	70.1	41.1	17
18	61.5	28.0	95.3	63.2	31.8	01.2	71.3	42.2	18
19	62.6	29.2	96.4	64.3	33.0	02.3	72.5	43.4	19
20	3263.7	3330.3	3397.5	3465.4	3534.1	3603.5	3673.7	3744.6	20
21	64.8	31.4	98.6	66.6	35.3	04.7	74.8	45.8	21
22	65.9	32.5	99.8	67.7	36.4	05.8	76.0	47.0	22
23	67.0	33.6	3400.9	68.9	37.6	07.0	77.2	48.2	23
24	68.1	34.7	02.0	70.0	38.7	08.2	78.4	49.4	24
25	3269.2	3335.9	3403.1	3471.1	3539.9	3609.3	3679.5	3750.6	25
26	70.3	37.0	04.3	72.3	41.0	10.5	80.7	51.8	26
27	71.4	38.1	05.4	73.4	42.2	11.6	81.9	52.9	27
28	72.6	39.2	06.5	74.6	43.3	12.8	83.1	54.1	28
29	73.7	40.3	07.7	75.7	44.5	14.0	84.3	55.3	29
30	3274.8	3341.4	3408.8	3476.8	3545.6	3615.1	3685.4	3756.5	30
31	75.9	42.6	09.9	78.0	46.8	16.3	86.6	57.7	31
32	77.0	43.7	11.0	79.1	47.9	17.5	87.8	58.9	32
33	78.1	44.8	12.2	80.3	49.1	18.6	89.0	60.1	33
34	79.2	45.9	13.3	81.4	50.2	19.8	90.1	61.3	34
35	3280.3	3347.0	3414.4	3482.5	3551.4	3621.0	3691.3	3762.5	35
36	81.4	48.1	15.6	83.7	52.5	22.1	92.5	63.7	36
37	82.5	49.3	16.7	84.8	53.7	23.3	93.7	64.9	37
38	83.6	50.4	17.8	86.0	54.8	24.5	94.9	66.1	38
39	84.7	51.5	18.9	87.1	56.0	25.6	96.0	67.3	39
40	3285.8	3352.6	3420.1	3488.2	3557.2	3626.8	3697.2	3768.5	40
41	86.9	53.7	21.2	89.4	58.3	28.0	98.4	69.6	41
42	88.0	54.8	22.3	90.5	59.5	29.1	99.6	70.8	42
43	89.2	56.0	23.5	91.7	60.6	30.3	3700.8	72.0	43
44	90.3	57.1	24.6	92.8	61.8	31.5	02.0	73.2	44
45	3291.4	3358.2	3425.7	3494.0	3562.9	3632.6	3703.1	3774.4	45
46	92.5	59.3	26.9	95.1	64.1	33.8	04.3	75.6	46
47	93.6	60.4	28.0	96.2	65.2	35.0	05.5	76.8	47
48	94.7	61.6	29.1	97.4	66.4	36.1	06.7	78.0	48
49	95.8	62.7	30.3	98.5	67.5	37.3	07.9	79.2	49
50	3296.9	3363.8	3431.4	3499.7	3568.7	3638.5	3709.0	3780.4	50
51	98.0	64.9	32.5	3500.8	69.9	39.7	10.2	81.6	51
52	99.1	66.0	33.7	02.0	71.0	40.8	11.4	82.8	52
53	3300.2	67.2	34.8	03.1	72.2	42.0	12.6	84.0	53
54	01.4	68.3	35.9	04.3	73.3	43.2	13.8	85.2	54
55	3302.5	3369.4	3437.1	3505.4	3574.5	3644.3	3715.0	3786.4	55
56	03.6	70.5	38.2	06.6	75.6	45.5	16.1	87.6	56
57	04.7	71.7	39.3	07.7	76.8	46.7	17.3	88.8	57
58	05.8	72.8	40.5	08.8	78.0	47.8	18.5	90.0	58
59	06.9	73.9	41.6	10.0	79.1	49.0	19.7	91.2	59
60	3308.0	3375.0	3442.7	3511.1	3580.3	3650.2	3720.9	3792.4	60
	59°	60°	61°	62°	63°	64°	65°	66°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	67°	68°	69°	70°	71°	72°	73°	74°	M.
0	3792.4	3864.7	3937.9	4011.9	4086.9	4162.8	4239.7	4317.6	0
1	93.6	65.9	39.1	13.2	88.2	64.1	41.0	18.9	1
2	94.8	67.1	40.3	14.4	89.4	65.4	42.3	20.2	2
3	96.0	68.3	41.6	15.7	90.7	66.7	43.6	21.5	3
4	97.2	69.6	42.8	16.9	92.0	67.9	44.9	22.8	4
5	3798.4	3870.8	3944.0	4018.2	4093.2	4169.2	4246.2	4324.1	5
6	99.6	72.0	45.2	19.4	94.5	70.5	47.5	25.4	6
7	3800.8	73.2	46.5	20.6	95.7	71.8	48.8	26.8	7
8	02.0	74.4	47.7	21.9	97.0	73.0	50.0	28.1	8
9	03.2	75.6	48.9	23.1	98.2	74.3	51.3	29.4	9
10	3804.4	3876.8	3950.2	4024.4	4099.5	4175.6	4252.6	4330.7	10
11	05.6	78.0	51.4	25.6	4100.8	76.9	53.9	32.0	11
12	06.8	79.3	52.6	26.9	02.0	78.1	55.2	33.3	12
13	08.0	80.5	53.9	28.1	03.3	79.4	56.5	34.6	13
14	09.2	81.7	55.1	29.4	04.5	80.7	57.8	35.9	14
15	3810.4	3882.9	3956.3	4030.6	4105.8	4182.0	4259.1	4337.2	15
16	11.6	84.1	57.5	31.8	07.1	83.2	60.4	38.5	16
17	12.8	85.3	58.8	33.1	08.3	84.5	61.7	39.9	17
18	14.0	86.6	60.0	34.3	09.6	85.8	63.0	41.2	18
19	15.2	87.8	61.2	35.6	10.9	87.1	64.3	42.5	19
20	3816.4	3889.0	3962.5	4036.8	4112.1	4188.4	4265.6	4343.8	20
21	17.6	90.2	63.7	38.1	13.4	89.6	66.9	45.1	21
22	18.8	91.4	64.9	39.3	14.6	90.9	68.2	46.4	22
23	20.0	92.6	66.2	40.6	15.9	92.2	69.5	47.7	23
24	21.2	93.9	67.4	41.8	17.2	93.5	70.7	49.0	24
25	3822.4	3895.1	3968.6	4043.1	4118.4	4194.8	4272.0	4350.4	25
26	23.6	96.3	69.9	44.3	19.7	96.0	73.3	51.7	26
27	24.8	97.5	71.1	45.6	21.0	97.3	74.6	53.0	27
28	26.0	98.7	72.3	46.8	22.2	98.6	75.9	54.3	28
29	27.2	3900.0	73.6	48.1	23.5	99.9	77.2	55.6	29
30	3828.4	3901.2	3974.8	4049.3	4124.8	4201.2	4278.5	4356.9	30
31	29.6	02.4	76.0	50.6	26.0	02.4	79.8	58.2	31
32	30.8	03.6	77.3	51.8	27.3	03.7	81.1	59.6	32
33	32.0	04.8	78.5	53.1	28.6	05.0	82.4	60.9	33
34	33.3	06.1	79.7	54.3	29.8	06.3	83.7	62.2	34
35	3834.5	3907.3	3981.0	4055.6	4131.1	4207.6	4285.0	4363.5	35
36	35.7	08.5	82.2	56.8	32.4	08.8	86.3	64.8	36
37	36.9	09.7	83.4	58.1	33.6	10.1	87.6	66.1	37
38	38.1	10.9	84.7	59.3	34.9	11.4	88.9	67.5	38
39	39.3	12.2	85.9	60.6	36.2	12.7	90.2	68.8	39
40	3840.5	3913.4	3987.2	4061.8	4137.4	4214.0	4291.5	4370.1	40
41	41.7	14.6	88.4	63.1	38.7	15.3	92.8	71.4	41
42	42.9	15.8	89.6	64.3	40.0	16.5	94.1	72.7	42
43	44.1	17.1	90.9	65.6	41.2	17.8	95.4	74.1	43
44	45.3	18.3	92.1	66.8	42.5	19.1	96.7	75.4	44
45	3846.5	3919.5	3993.3	4068.1	4143.8	4220.4	4298.0	4376.7	45
46	47.7	20.7	94.6	69.3	45.0	21.7	99.3	78.0	46
47	49.0	21.9	95.8	70.6	46.3	23.0	4300.6	79.3	47
48	50.2	23.2	97.1	71.9	47.6	24.3	01.9	80.6	48
49	51.4	24.4	98.3	73.1	48.8	25.5	03.2	82.0	49
50	3852.6	3925.6	3999.5	4074.4	4150.1	4226.8	4304.6	4383.3	50
51	53.8	26.8	4000.8	75.6	51.4	28.1	05.9	84.6	51
52	55.0	28.1	02.0	76.9	52.7	29.4	07.2	85.9	52
53	56.2	29.3	03.3	78.1	53.9	30.7	08.5	87.3	53
54	57.4	30.5	04.5	79.4	55.2	32.0	09.8	88.6	54
55	3858.6	3931.7	4005.7	4080.6	4156.5	4233.3	4311.1	4389.9	55
56	59.9	33.0	07.0	81.9	57.7	34.6	12.4	91.2	56
57	61.1	34.2	08.2	83.1	59.0	35.9	13.7	92.5	57
58	62.3	35.4	09.5	84.4	60.3	37.1	15.0	93.9	58
59	63.5	36.7	10.7	85.7	61.6	38.4	16.3	95.2	59
60	3864.7	3937.9	4011.9	4086.9	4162.8	4239.7	4317.6	4396.5	60
	67°	68°	69°	70°	71°	72°	73°	74°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	75°	76°	77°	78°	79°	80°	81°	82°	M.
0	4396.5	4476.5	4557.6	4639.8	4723.2	4807.7	4893.6	4980.7	0
1	97.8	77.8	58.9	41.2	24.6	09.2	95.0	82.2	1
2	99.2	79.2	60.3	42.5	26.0	10.6	96.5	83.6	2
3	4400.5	80.5	61.7	43.9	27.4	12.0	97.9	85.1	3
4	01.8	81.9	63.0	45.3	28.8	13.4	99.4	86.6	4
5	4403.1	4483.2	4564.4	4646.7	4730.2	4814.9	4900.8	4988.0	5
6	04.5	84.6	65.7	48.1	31.6	16.3	02.2	89.5	6
7	05.8	85.9	67.1	49.4	33.0	17.7	03.7	91.0	7
8	07.1	87.2	68.5	50.8	34.4	19.1	05.1	92.4	8
9	08.4	88.6	69.8	52.2	35.8	20.5	06.6	93.9	9
10	4409.8	4489.9	4571.2	4653.6	4737.2	4822.0	4908.0	4995.4	10
11	11.1	91.3	72.6	55.0	38.6	23.4	09.5	96.8	11
12	12.4	92.6	73.9	56.4	40.0	24.8	10.9	98.3	12
13	13.8	94.0	75.3	57.7	41.4	26.2	12.4	99.8	13
14	15.1	95.3	76.6	59.1	42.8	27.7	13.8	5001.2	14
15	4416.4	4496.7	4578.0	4660.5	4744.2	4829.1	4915.2	5002.7	15
16	17.7	98.0	79.4	61.9	45.6	30.5	16.7	04.2	16
17	19.1	99.4	80.7	63.3	47.0	31.9	18.1	05.6	17
18	20.4	4500.7	82.1	64.7	48.4	33.4	19.6	07.1	18
19	21.7	02.0	83.5	66.1	49.8	34.8	21.0	08.6	19
20	4423.1	4503.4	4584.8	4667.4	4751.2	4836.2	4922.5	5010.0	20
21	24.4	04.7	86.2	68.8	52.6	37.6	23.9	11.5	21
22	25.7	06.1	87.6	70.2	54.0	39.1	25.4	13.0	22
23	27.0	07.4	89.0	71.6	55.4	40.5	26.8	14.5	23
24	28.4	08.8	90.3	73.0	56.8	41.9	28.3	15.9	24
25	4429.7	4510.1	4591.7	4674.4	4758.3	4843.4	4929.7	5017.4	25
26	31.0	11.5	93.1	75.8	59.7	44.8	31.2	18.9	26
27	32.4	12.8	94.4	77.2	61.1	46.2	32.6	20.3	27
28	33.7	14.2	95.8	78.5	62.5	47.6	34.1	21.8	28
29	35.0	15.5	97.2	79.9	63.9	49.1	35.5	23.3	29
30	4436.4	4516.9	4598.5	4681.3	4765.3	4850.5	4937.0	5024.8	30
31	37.7	18.2	99.9	82.7	66.7	51.9	38.4	26.2	31
32	39.0	19.6	4601.3	84.1	68.1	53.4	39.9	27.7	32
33	40.4	20.9	02.6	85.5	69.5	54.8	41.3	29.2	33
34	41.7	22.3	04.0	86.9	70.9	56.2	42.8	30.7	34
35	4443.0	4523.7	4605.4	4688.3	4772.4	4857.7	4944.2	5032.1	35
36	44.4	25.0	06.8	89.7	73.8	59.1	45.7	33.6	36
37	45.7	26.4	08.1	91.1	75.2	60.5	47.2	35.1	37
38	47.0	27.7	09.5	92.4	76.6	62.0	48.6	36.6	38
39	48.4	29.1	10.9	93.8	78.0	63.4	50.1	38.1	39
40	4449.7	4530.4	4612.2	4695.2	4779.4	4864.8	4951.5	5039.5	40
41	51.1	31.8	13.6	96.6	80.8	66.3	53.0	41.0	41
42	52.4	33.1	15.0	98.0	82.2	67.7	54.4	42.5	42
43	53.7	34.5	16.4	99.4	83.7	69.1	55.9	44.0	43
44	55.1	35.8	17.7	4700.8	85.1	70.6	57.3	45.4	44
45	4456.4	4537.2	4619.1	4702.2	4786.5	4872.0	4958.8	5046.9	45
46	57.7	38.6	20.5	03.6	87.9	73.4	60.3	48.4	46
47	59.1	39.9	21.9	05.0	89.3	74.9	61.7	49.9	47
48	60.4	41.3	23.2	06.4	90.7	76.3	63.2	51.4	48
49	61.7	42.6	24.6	07.8	92.1	77.8	64.6	52.8	49
50	4463.1	4544.0	4626.0	4709.2	4793.6	4879.2	4966.1	5054.3	50
51	64.4	45.3	27.4	10.6	95.0	80.6	67.6	55.8	51
52	65.8	46.7	28.8	12.0	96.4	82.1	69.0	57.3	52
53	67.1	48.1	30.1	13.4	97.8	83.5	70.5	58.8	53
54	68.4	49.4	31.5	14.8	99.2	84.9	71.9	60.3	54
55	4469.8	4550.8	4632.9	4716.2	4800.7	4886.4	4973.4	5061.7	55
56	71.1	52.1	34.3	17.6	02.1	87.8	74.9	63.2	56
57	72.5	53.5	35.6	19.0	03.5	89.3	76.3	64.7	57
58	73.8	54.9	37.0	20.4	04.9	90.7	77.8	66.2	58
59	75.2	56.2	38.4	21.8	06.3	92.1	79.2	67.7	59
60	4476.5	4557.6	4639.8	4723.2	4807.7	4893.6	4980.7	5069.2	60
	75°	76°	77°	78°	79°	80°	81°	82°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	83°	84°	85°	86°	87°	88°	89°	90°	M.
0	5069.2	5159.0	5250.3	5343.0	5437.2	5533.1	5630.5	5729.7	0
1	70.7	60.5	51.8	44.5	38.8	34.7	32.2	31.3	1
2	72.1	62.0	53.3	46.1	40.4	36.3	33.8	33.0	2
3	73.6	63.5	54.9	47.7	42.0	37.9	35.4	34.7	3
4	75.1	65.0	56.4	49.2	43.6	39.5	37.1	36.3	4
5	5076.6	5166.6	5257.9	5350.8	5445.2	5541.1	5638.7	5738.0	5
6	78.1	68.1	59.5	52.3	46.7	42.7	40.3	39.7	6
7	79.6	69.6	61.0	53.9	48.3	44.3	42.0	41.3	7
8	81.1	71.1	62.5	55.5	49.9	46.0	43.6	43.0	8
9	82.6	72.6	64.1	57.0	51.5	47.6	45.3	44.7	9
10	5084.0	5174.1	5265.6	5358.6	5453.1	5549.2	5646.9	5746.3	10
11	85.5	75.6	67.1	60.1	54.7	50.8	48.6	48.0	11
12	87.0	77.1	68.7	61.7	56.3	52.4	50.2	49.7	12
13	88.5	78.7	70.2	63.3	57.9	54.0	51.8	51.4	13
14	90.0	80.2	71.8	64.8	59.5	55.7	53.5	53.0	14
15	5091.5	5181.7	5273.3	5366.4	5461.0	5557.3	5655.1	5754.7	15
16	93.0	83.2	74.8	68.0	62.6	58.9	56.8	56.4	16
17	94.5	84.7	76.4	69.5	64.2	60.5	58.4	58.1	17
18	96.0	86.2	77.9	71.1	65.8	62.1	60.1	59.7	18
19	97.5	87.7	79.5	72.7	67.4	63.7	61.7	61.4	19
20	5099.0	5189.3	5281.0	5374.2	5469.0	5565.4	5663.4	5763.1	20
21	5100.4	90.8	82.5	75.8	70.6	67.0	65.0	64.8	21
22	01.9	92.3	84.1	77.4	72.2	68.6	66.7	66.4	22
23	03.4	93.8	85.6	78.9	73.8	70.2	68.3	68.1	23
24	04.9	95.3	87.2	80.5	75.4	71.8	70.0	69.8	24
25	5106.4	5196.8	5288.7	5382.1	5477.0	5573.5	5671.6	5771.5	25
26	07.9	98.4	90.3	83.6	78.6	75.1	73.3	73.2	26
27	09.4	99.9	91.8	85.2	80.2	76.7	74.9	74.8	27
28	10.9	5201.4	93.3	86.8	81.8	78.3	76.6	76.5	28
29	12.4	02.9	94.9	88.3	83.4	80.0	78.2	78.2	29
30	5113.9	5204.4	5296.4	5389.9	5484.9	5581.6	5679.9	5779.9	30
31	15.4	06.0	98.0	91.5	86.5	83.2	81.5	81.6	31
32	16.9	07.5	99.5	93.1	88.1	84.8	83.2	83.2	32
33	18.4	09.0	5301.1	94.6	89.7	86.5	84.8	84.9	33
34	19.9	10.5	02.6	96.2	91.3	88.1	86.5	86.6	34
35	5121.4	5212.1	5304.2	5397.8	5492.9	5589.7	5688.1	5788.3	35
36	22.9	13.6	05.7	99.3	94.5	91.3	89.8	90.0	36
37	24.4	15.1	07.3	5400.9	96.1	93.0	91.4	91.7	37
38	25.9	16.6	08.8	02.5	97.7	94.6	93.1	93.3	38
39	27.4	18.2	10.4	04.1	99.3	96.2	94.8	95.0	39
40	5128.9	5219.7	5311.9	5405.6	5500.9	5597.8	5696.4	5796.7	40
41	30.4	21.2	13.5	07.2	02.5	99.5	98.1	98.4	41
42	31.9	22.7	15.0	08.8	04.1	5601.1	99.7	5800.1	42
43	33.4	24.3	16.6	10.4	05.7	02.7	5701.4	01.8	43
44	34.9	25.8	18.1	12.0	07.3	04.4	03.0	03.5	44
45	5136.4	5227.3	5319.7	5413.5	5509.0	5606.0	5704.7	5805.1	45
46	37.9	28.8	21.2	15.1	10.6	07.6	06.4	06.8	46
47	39.4	30.4	22.8	16.7	12.2	09.3	08.0	08.5	47
48	40.9	31.9	24.3	18.3	13.8	10.9	09.7	10.2	48
49	42.4	33.4	25.9	19.8	15.4	12.5	11.3	11.9	49
50	5143.9	5234.9	5327.4	5421.4	5517.0	5614.2	5713.0	5813.6	50
51	45.4	36.5	29.0	23.0	18.6	15.8	14.7	15.3	51
52	46.9	38.0	30.5	24.6	20.2	17.4	16.3	17.0	52
53	48.4	39.5	32.1	26.2	21.8	19.1	18.0	18.7	53
54	50.0	41.1	33.6	27.7	23.4	20.7	19.7	20.4	54
55	5151.5	5242.6	5335.2	5429.3	5525.0	5622.3	5721.3	5822.1	55
56	53.0	44.1	36.8	30.9	26.6	24.0	23.0	23.8	56
57	54.5	45.7	38.3	32.5	28.2	25.6	24.7	25.4	57
58	56.0	47.2	39.9	34.1	29.8	27.2	26.3	27.1	58
59	57.5	48.7	41.4	35.7	31.4	28.9	28.0	28.8	59
60	5159.0	5250.3	5343.0	5437.2	5533.1	5630.5	5729.7	5830.5	60
	83°	84°	85°	86°	87°	88°	89°	90°	

TABLE III.—TANGENT DISTANCES FOR A 1° CURVE.

M.	91°	92°	93°	94°	95°	96°	97°	98°	M.
0	5830.5	5933.2	6037.8	6144.3	6252.8	6363.4	6476.2	6591.2	0
1	32.2	35.0	39.6	46.1	54.6	65.3	78.1	93.1	1
2	33.9	36.7	41.3	47.9	56.5	67.1	80.0	95.1	2
3	35.6	38.4	43.1	49.7	58.3	69.0	81.9	97.0	3
4	37.3	40.1	44.8	51.5	60.1	70.9	83.8	99.0	4
5	5839.0	5941.9	6046.6	6153.3	6262.0	6372.7	6485.7	6600.9	5
6	40.7	43.6	48.4	55.1	63.8	74.6	87.6	02.8	6
7	42.4	45.3	50.1	56.9	65.6	76.5	89.5	04.8	7
8	44.1	47.1	51.9	58.6	67.4	78.3	91.4	06.7	8
9	45.8	48.8	53.6	60.4	69.3	80.2	93.3	08.7	9
10	5847.5	5950.5	6055.4	6162.2	6271.1	6382.1	6495.2	6610.6	10
11	49.2	52.3	57.2	64.0	72.9	83.9	97.1	12.5	11
12	50.9	54.0	58.9	65.8	74.8	85.8	99.0	14.5	12
13	52.6	55.7	60.7	67.6	76.6	87.7	6500.9	16.4	13
14	54.3	57.5	62.5	69.4	78.4	89.5	02.8	18.4	14
15	5856.0	5959.2	6064.2	6171.2	6280.3	6391.4	6504.7	6620.3	15
16	57.7	60.9	66.0	73.0	82.1	93.3	06.6	22.3	16
17	59.4	62.7	67.8	74.8	83.9	95.2	08.5	24.2	17
18	61.1	64.4	69.5	76.6	85.8	97.0	10.5	26.2	18
19	62.9	66.1	71.3	78.4	87.6	98.9	12.4	28.1	19
20	5864.6	5967.9	6073.1	6180.2	6289.4	6400.8	6514.3	6630.1	20
21	66.3	69.6	74.8	82.0	91.3	02.6	16.2	32.0	21
22	68.0	71.3	76.6	83.9	93.1	04.5	18.1	34.0	22
23	69.7	73.1	78.4	85.7	95.0	06.4	20.0	35.9	23
24	71.4	74.8	80.2	87.5	96.8	08.3	21.9	37.9	24
25	5873.1	5976.6	6081.9	6189.3	6298.6	6410.1	6523.8	6639.8	25
26	74.8	78.3	83.7	91.1	6300.5	12.0	25.8	41.8	26
27	76.5	80.0	85.5	92.9	02.3	13.9	27.7	43.7	27
28	78.2	81.8	87.2	94.7	04.2	15.8	29.6	45.7	28
29	79.9	83.5	89.0	96.5	06.0	17.7	31.5	47.6	29
30	5881.7	5985.3	6090.8	6198.3	6307.9	6419.5	6533.4	6649.6	30
31	83.4	87.0	92.6	6200.1	09.7	21.4	35.3	51.5	31
32	85.1	88.8	94.3	01.9	11.5	23.3	37.2	53.5	32
33	86.8	90.5	96.1	03.7	13.4	25.2	39.2	55.5	33
34	88.5	92.2	97.9	05.5	15.2	27.1	41.1	57.4	34
35	5890.2	5994.0	6099.7	6207.4	6317.1	6428.9	6543.0	6659.4	35
36	91.9	95.7	6101.5	09.2	18.9	30.8	44.9	61.3	36
37	93.6	97.5	03.2	11.0	20.8	32.7	46.8	63.3	37
38	95.4	99.2	05.0	12.8	22.6	34.6	48.8	65.3	38
39	97.1	6001.0	06.8	14.6	24.5	36.5	50.7	67.2	39
40	5898.8	6002.7	6108.6	6216.4	6326.3	6438.4	6552.6	6669.2	40
41	5900.5	04.5	10.4	18.2	28.2	40.2	54.5	71.1	41
42	02.2	06.2	12.1	20.0	30.0	42.1	56.5	73.1	42
43	03.9	08.0	13.9	21.9	31.9	44.0	58.4	75.1	43
44	05.7	09.7	15.7	23.7	33.7	45.9	60.3	77.0	44
45	5907.4	6011.5	6117.5	6225.5	6335.6	6447.8	6562.2	6679.0	45
46	09.1	13.2	19.3	27.3	37.4	49.7	64.2	81.0	46
47	10.8	15.0	21.1	29.1	39.3	51.6	66.1	82.9	47
48	12.5	16.7	22.8	30.9	41.1	53.5	68.0	84.9	48
49	14.3	18.5	24.6	32.8	43.0	55.4	70.0	86.9	49
50	5916.0	6020.2	6126.4	6234.6	6344.8	6457.2	6571.9	6688.8	50
51	17.7	22.0	28.2	36.4	46.7	59.1	73.8	90.8	51
52	19.4	23.7	30.0	38.2	48.6	61.0	75.7	92.8	52
53	21.2	25.5	31.8	40.0	50.4	62.9	77.7	94.7	53
54	22.9	27.2	33.6	41.9	52.3	64.8	79.6	96.7	54
55	5924.6	6029.0	6135.3	6243.7	6354.1	6466.7	6581.5	6698.7	55
56	26.3	30.8	37.1	45.5	56.0	68.6	83.5	6700.7	56
57	28.0	32.5	38.9	47.3	57.8	70.5	85.4	02.6	57
58	29.8	34.3	40.7	49.2	59.7	72.4	87.3	04.6	58
59	31.5	36.0	42.5	51.0	61.6	74.3	89.3	06.6	59
60	5933.2	6037.8	6144.3	6252.8	6363.4	6476.2	6591.2	6708.6	60
	91°	92°	93°	94°	95°	96°	97°	98°	

always 6ft

TABLE IV.—CORRECTIONS FOR TANGENT DISTANCES.

Int. Ang. I	DEGREE OF CURVE.												Int. Ang. I
	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	
1°	.00	.00	.00	.00	.00	.00	.01	.01	.01	.01	.01	.01	1°
2	.00	.00	.00	.01	.01	.01	.01	.01	.01	.01	.02	.02	2
3	.00	.01	.01	.01	.01	.01	.02	.02	.02	.02	.02	.02	3
4	.00	.01	.01	.01	.01	.02	.02	.02	.03	.03	.03	.03	4
5	.00	.01	.01	.02	.02	.02	.03	.03	.03	.03	.04	.04	5
6	.01	.01	.01	.02	.02	.03	.03	.03	.04	.04	.05	.05	6
7	.01	.01	.02	.02	.03	.03	.04	.04	.04	.05	.05	.06	7
8	.01	.01	.02	.02	.03	.03	.04	.05	.05	.06	.06	.07	8
9	.01	.02	.02	.03	.03	.04	.05	.05	.06	.06	.07	.07	9
10	.01	.02	.02	.03	.04	.04	.05	.06	.06	.07	.08	.08	10
11	.01	.02	.03	.03	.04	.05	.06	.06	.07	.08	.08	.09	11
12	.01	.02	.03	.04	.04	.05	.06	.07	.08	.08	.09	.10	12
13	.01	.02	.03	.04	.05	.06	.07	.07	.08	.09	.10	.11	13
14	.01	.02	.03	.04	.05	.06	.07	.08	.09	.10	.11	.12	14
15	.01	.03	.04	.05	.06	.07	.08	.09	.09	.10	.11	.12	15
16	.02	.03	.04	.05	.06	.07	.08	.09	.10	.11	.12	.13	16
17	.02	.03	.04	.05	.06	.07	.09	.10	.11	.12	.13	.14	17
18	.02	.03	.04	.06	.07	.08	.09	.10	.11	.13	.14	.15	18
19	.02	.03	.05	.06	.07	.08	.10	.11	.12	.13	.15	.16	19
20	.02	.03	.05	.06	.07	.09	.10	.11	.13	.14	.15	.17	20
21	.02	.04	.05	.06	.08	.09	.11	.12	.13	.15	.16	.17	21
22	.02	.04	.05	.07	.08	.10	.11	.13	.14	.15	.17	.18	22
23	.02	.04	.06	.07	.09	.10	.12	.13	.15	.16	.18	.19	23
24	.02	.04	.06	.07	.09	.11	.12	.14	.15	.17	.18	.20	24
25	.02	.04	.06	.08	.09	.11	.13	.14	.16	.18	.19	.21	25
26	.03	.04	.06	.08	.10	.12	.13	.15	.17	.18	.20	.22	26
27	.03	.05	.07	.08	.10	.12	.14	.16	.17	.19	.21	.23	27
28	.03	.05	.07	.09	.11	.12	.14	.16	.18	.20	.22	.23	28
29	.03	.05	.07	.09	.11	.13	.15	.17	.19	.21	.22	.24	29
30	.03	.05	.07	.09	.11	.13	.15	.17	.19	.21	.23	.25	30
31	.03	.05	.08	.10	.12	.14	.16	.18	.20	.22	.24	.26	31
32	.03	.06	.08	.10	.12	.14	.16	.19	.21	.23	.25	.27	32
33	.03	.06	.08	.10	.13	.15	.17	.19	.21	.24	.26	.28	33
34	.03	.06	.08	.11	.13	.15	.18	.20	.22	.24	.27	.29	34
35	.03	.06	.09	.11	.13	.16	.18	.20	.23	.25	.27	.30	35
36	.04	.06	.09	.11	.14	.16	.19	.21	.23	.26	.28	.31	36
37	.04	.06	.09	.12	.14	.17	.19	.22	.24	.27	.29	.31	37
38	.04	.07	.09	.12	.15	.17	.20	.22	.25	.27	.30	.32	38
39	.04	.07	.10	.12	.15	.18	.20	.23	.26	.28	.31	.33	39
40	.04	.07	.10	.13	.15	.18	.21	.24	.26	.29	.32	.34	40
41	.04	.07	.10	.13	.16	.19	.21	.24	.27	.30	.32	.35	41
42	.04	.07	.10	.13	.16	.19	.22	.25	.28	.30	.33	.36	42
43	.04	.08	.11	.14	.17	.20	.23	.25	.28	.31	.34	.37	43
44	.04	.08	.11	.14	.17	.20	.23	.26	.29	.32	.35	.38	44
45	.05	.08	.11	.14	.18	.21	.24	.27	.30	.33	.36	.39	45
46	.05	.08	.12	.15	.18	.21	.24	.27	.31	.34	.37	.40	46
47	.05	.08	.12	.15	.18	.22	.25	.28	.31	.35	.38	.41	47
48	.05	.09	.12	.16	.19	.22	.26	.29	.32	.35	.39	.42	48
49	.05	.09	.12	.16	.19	.23	.26	.29	.33	.36	.40	.43	49
50	.05	.09	.13	.16	.20	.23	.27	.30	.34	.37	.40	.44	50
51	.05	.09	.13	.17	.20	.24	.27	.31	.34	.38	.41	.45	51
52	.05	.09	.13	.17	.21	.24	.28	.32	.35	.39	.42	.46	52
53	.05	.10	.14	.17	.21	.25	.29	.32	.36	.40	.43	.47	53
54	.06	.10	.14	.18	.22	.25	.29	.33	.37	.40	.44	.48	54
55	.06	.10	.14	.18	.22	.26	.30	.34	.38	.41	.45	.49	55
56	.06	.10	.15	.19	.23	.27	.30	.34	.38	.42	.46	.50	56
57	.06	.11	.15	.19	.23	.27	.31	.35	.39	.43	.47	.51	57
58	.06	.11	.15	.19	.24	.28	.32	.36	.40	.44	.48	.52	58
59	.06	.11	.15	.20	.24	.28	.32	.37	.41	.45	.49	.53	59
60	.06	.11	.16	.20	.24	.29	.33	.37	.42	.46	.50	.54	60
	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°	

TABLE IV.—CORRECTIONS FOR TANGENT DISTANCES.

Int. Ang. I	DEGREE OF CURVE.											
	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°
61°	.06	.11	.16	.21	.25	.29	.34	.38	.42	.47	.51	.55
62	.07	.12	.16	.21	.25	.30	.34	.39	.43	.48	.52	.57
63	.07	.12	.17	.21	.26	.31	.35	.40	.44	.49	.53	.58
64	.07	.12	.17	.22	.27	.31	.36	.40	.45	.50	.54	.59
65	.07	.12	.17	.22	.27	.32	.37	.41	.46	.51	.55	.60
66	.07	.13	.18	.23	.28	.32	.37	.42	.47	.52	.56	.61
67	.07	.13	.18	.23	.28	.33	.38	.43	.48	.53	.57	.62
68	.07	.13	.18	.24	.29	.34	.39	.44	.49	.54	.59	.63
69	.07	.13	.19	.24	.29	.34	.39	.44	.50	.55	.60	.65
70	.08	.14	.19	.24	.30	.35	.40	.45	.50	.56	.61	.66
71	.08	.14	.19	.25	.30	.36	.41	.46	.51	.57	.62	.67
72	.08	.14	.20	.25	.31	.36	.42	.47	.52	.58	.63	.68
73	.08	.14	.20	.26	.31	.37	.42	.48	.53	.59	.64	.70
74	.08	.15	.21	.26	.32	.38	.43	.49	.54	.60	.65	.71
75	.08	.15	.21	.27	.33	.38	.44	.50	.55	.61	.67	.72
76	.09	.15	.21	.27	.33	.39	.45	.51	.56	.62	.68	.74
77	.09	.15	.22	.28	.34	.40	.46	.51	.57	.63	.69	.75
78	.09	.16	.22	.28	.34	.40	.46	.52	.58	.64	.70	.76
79	.09	.16	.22	.29	.35	.41	.47	.53	.59	.65	.72	.78
80	.09	.16	.23	.29	.36	.42	.48	.54	.60	.67	.73	.79
81	.09	.17	.23	.30	.36	.43	.49	.55	.62	.68	.74	.80
82	.09	.17	.24	.30	.37	.43	.50	.56	.63	.69	.75	.82
83	.10	.17	.24	.31	.38	.44	.51	.57	.64	.70	.77	.83
84	.10	.17	.25	.31	.38	.45	.52	.58	.65	.72	.78	.85
85	.10	.18	.25	.32	.39	.46	.53	.59	.66	.73	.80	.86
86	.10	.18	.25	.33	.40	.47	.53	.60	.67	.74	.81	.88
87	.10	.18	.26	.33	.40	.47	.54	.61	.68	.75	.82	.89
88	.11	.19	.26	.34	.41	.48	.55	.62	.70	.77	.84	.91
89	.11	.19	.27	.34	.42	.49	.56	.64	.71	.78	.85	.92
90	.11	.19	.27	.35	.42	.50	.57	.65	.72	.79	.87	.94
91	.11	.20	.28	.36	.43	.51	.58	.66	.73	.81	.88	.96
92	.11	.20	.28	.36	.44	.52	.59	.67	.75	.82	.90	.97
93	.11	.20	.29	.37	.45	.53	.60	.68	.76	.84	.91	.99
94	.12	.21	.29	.37	.46	.53	.61	.69	.77	.85	.93	1.01
95	.12	.21	.30	.38	.46	.54	.63	.71	.79	.87	.95	1.03
96	.12	.22	.30	.39	.47	.55	.64	.72	.80	.88	.96	1.05
97	.12	.22	.31	.39	.48	.56	.65	.73	.81	.90	.98	1.06
98	.13	.22	.31	.40	.49	.57	.66	.74	.83	.91	1.00	1.08
99	.13	.23	.32	.41	.50	.58	.67	.76	.84	.93	1.02	1.10
100	.13	.23	.33	.42	.51	.59	.68	.77	.86	.95	1.03	1.12
101	.13	.24	.33	.42	.51	.61	.70	.78	.87	.96	1.05	1.14
102	.13	.24	.34	.43	.52	.62	.71	.80	.89	.98	1.07	1.16
103	.14	.24	.34	.44	.53	.63	.72	.81	.91	1.00	1.09	1.18
104	.14	.25	.35	.45	.54	.64	.73	.83	.92	1.02	1.11	1.20
105	.14	.25	.36	.46	.55	.65	.75	.84	.94	1.04	1.13	1.23
106	.14	.26	.36	.46	.56	.66	.76	.86	.96	1.05	1.15	1.25
107	.15	.26	.37	.47	.57	.67	.77	.87	.97	1.07	1.17	1.27
108	.15	.27	.38	.48	.58	.69	.79	.89	.99	1.09	1.19	1.30
109	.15	.27	.38	.49	.59	.70	.80	.91	1.01	1.11	1.22	1.32
110	.16	.28	.39	.50	.61	.71	.82	.92	1.03	1.13	1.24	1.34
111	.16	.28	.40	.51	.62	.73	.83	.94	1.05	1.16	1.26	1.37
112	.16	.29	.40	.52	.63	.74	.85	.96	1.07	1.18	1.29	1.40
113	.16	.29	.41	.53	.64	.75	.87	.98	1.09	1.20	1.31	1.42
114	.17	.30	.42	.54	.65	.77	.88	1.00	1.11	1.22	1.34	1.45
115	.17	.30	.43	.55	.67	.78	.90	1.01	1.13	1.25	1.36	1.48
116	.17	.31	.44	.56	.68	.80	.92	1.04	1.15	1.27	1.39	1.51
117	.18	.32	.45	.57	.69	.81	.94	1.06	1.18	1.30	1.42	1.54
118	.18	.32	.45	.58	.71	.83	.95	1.08	1.20	1.32	1.44	1.57
119	.19	.33	.46	.59	.72	.85	.97	1.10	1.22	1.35	1.47	1.60
120	.19	.34	.47	.60	.73	.86	.99	1.12	1.25	1.38	1.50	1.63
	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°	13°

TABLE V.—EXTERNAL DISTANCES FOR A 1° CURVE.

Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.
1° 0′	.2	11° 0′	26.5	21° 0′	97.6	31° 0′	216.2	41° 0′	387.4	51° 0′	618.4
10	.3	10	27.3	10	99.2	10	218.7	10	390.7	10	622.8
20	.4	20	28.1	20	100.7	20	221.1	20	394.1	20	627.2
30	.5	30	29.0	30	102.3	30	223.5	30	397.4	30	631.7
40	.6	40	29.8	40	104.0	40	226.0	40	400.8	40	636.2
50	.7	50	30.7	50	105.6	50	228.4	50	404.2	50	640.7
2° 0	.9	12° 0	31.6	22° 0	107.2	32° 0	230.9	42° 0	407.6	52° 0	645.2
10	1.0	10	32.4	10	108.9	10	233.4	10	411.1	10	649.7
20	1.2	20	33.3	20	110.6	20	235.9	20	414.5	20	654.3
30	1.4	30	34.3	30	112.3	30	238.4	30	418.0	30	658.8
40	1.6	40	35.2	40	113.9	40	241.0	40	421.5	40	663.4
50	1.8	50	36.1	50	115.7	50	243.5	50	425.0	50	668.0
3° 0	2.0	13° 0	37.1	23° 0	117.4	33° 0	246.1	43° 0	428.5	53° 0	672.7
10	2.2	10	38.0	10	119.1	10	248.7	10	432.0	10	677.3
20	2.4	20	39.0	20	120.9	20	251.3	20	435.6	20	682.0
30	2.7	30	40.0	30	122.6	30	253.9	30	439.2	30	686.7
40	2.9	40	41.0	40	124.4	40	256.5	40	442.7	40	691.4
50	3 2	50	42.0	50	126.2	50	259.1	50	446.4	50	696.1
4° 0	3.5	14° 0	43.0	24° 0	128.0	34° 0	261.8	44° 0	450.0	54° 0	700.9
10	3.8	10	44.1	10	129.8	10	264.5	10	453.6	10	705.7
20	4.1	20	45.1	20	131.7	20	267.2	20	457.3	20	710.5
30	4.4	30	46.2	30	133.5	30	269.9	30	460.9	30	715.3
40	4.8	40	47.3	40	135.4	40	272.6	40	464.6	40	720.1
50	5.1	50	48.3	50	137.2	50	275.3	50	468.4	50	725.0
5° 0	5.5	15° 0	49.4	25° 0	139.1	35° 0	278.1	45° 0	472.1	55° 0	729.9
10	5.8	10	50.6	10	141.0	10	280.8	10	475.8	10	734.8
20	6.2	20	51.7	20	142.9	20	283.6	20	479.6	20	739.7
30	6.6	30	52.8	30	144.9	30	286.4	30	483.4	30	744.6
40	7.0	40	54.0	40	146.8	40	289.2	40	487.2	40	749.6
50	7.4	50	55.1	50	148.7	50	292.0	50	491.0	50	754.6
6° 0	7.9	16° 0	56.3	26° 0	150.7	36° 0	294.9	46° 0	494.8	56° 0	759.6
10	8.3	10	57.5	10	152.7	10	297.7	10	498.7	10	764.6
20	8.8	20	58.7	20	154.7	20	300.6	20	502.5	20	769.7
30	9.2	30	59.9	30	156.7	30	303.5	30	506.4	30	774.7
40	9.7	40	61.1	40	158.7	40	306.4	40	510.3	40	779.8
50	10.2	50	62.4	50	160.8	50	309.3	50	514.3	50	784.9
7° 0	10.7	17° 0	63.6	27° 0	162.8	37° 0	312.2	47° 0	518.2	57° 0	790.1
10	11.2	10	64.9	10	164.9	10	315.2	10	522.2	10	795.2
20	11.8	20	66.2	20	167.0	20	318.1	20	526.1	20	800.4
30	12.3	30	67.5	30	169.0	30	321.1	30	530.1	30	805.6
40	12.8	40	68.8	40	171.2	40	324.1	40	534.1	40	810.9
50	13.4	50	70.1	50	173.3	50	327.1	50	538.2	50	816.1
8° 0	14.0	18° 0	71.4	28° 0	175.4	38° 0	330.1	48° 0	542.2	58° 0	821.4
10	14.6	10	72.8	10	177.6	10	333.2	10	546.3	10	826.7
20	15.2	20	74.1	20	179.7	20	336.2	20	550.4	20	832.0
30	15.8	30	75.5	30	181.9	30	339.3	30	554.5	30	837.3
40	16.4	40	76.9	40	184.1	40	342.4	40	558.6	40	842.7
50	17.1	50	78.3	50	186.3	50	345.5	50	562.8	50	848.1
9° 0	17.7	19° 0	79.7	29° 0	188.5	39° 0	348.6	49° 0	566.9	59° 0	853.5
10	18.4	10	81.1	10	190.7	10	351.8	10	571.1	10	858.9
20	19.1	20	82.5	20	193.0	20	354.9	20	575.3	20	864.3
30	19.7	30	84.0	30	195.2	30	358.1	30	579.5	30	869.8
40	20.4	40	85.4	40	197.5	40	361.3	40	583.8	40	875.3
50	21.2	50	86.9	50	199.8	50	364.5	50	588.0	50	880.8
10° 0	21.9	20° 0	88.4	30° 0	202.1	40° 0	367.7	50° 0	592.3	60° 0	886.4
10	22.6	10	89.9	10	204.4	10	371.0	10	596.6	10	891.9
20	23.4	20	91.4	20	206.8	20	374.2	20	600.9	20	897.5
30	24.1	30	92.9	30	209.1	30	377.5	30	605 3	30	903.2
40	24.9	40	94.5	40	211.5	40	380.8	40	609.6	40	908.8
50	25.7	50	96.0	50	213.9	50	384.1	50	614.0	50	914.5

TABLE V.—EXTERNAL DISTANCES FOR A 1° CURVE.

Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.	Angle I.	Ext. Dis.
61° 0′	920.1	71° 0′	1308.2	81° 0′	1805.3	91° 0′	2444.9	101° 0′	3278.1
10	925.8	10	1315.5	10	1814.7	10	2457.1	10	3294.1
20	931.6	20	1322.9	20	1824.1	20	2469.3	20	3310.1
30	937.3	30	1330.3	30	1833.6	30	2481.5	30	3326.1
40	943.1	40	1337.7	40	1843.1	40	2493.8	40	3342.3
50	948.9	50	1345.1	50	1852.6	50	2506.1	50	3358.5
62° 0	954.8	72° 0	1352.6	82° 0	1862.2	92° 0	2518.5	102° 0	3374.9
10	960.6	10	1360.1	10	1871.8	10	2531.0	10	3391.2
20	966.5	20	1367.6	20	1881.5	20	2543.5	20	3407.7
30	972.4	30	1375.2	30	1891.2	30	2556.0	30	3424.3
40	978.3	40	1382.8	40	1900.9	40	2568.6	40	3440.9
50	984.3	50	1390.4	50	1910.7	50	2581.3	50	3457.6
63° 0	990.2	73° 0	1398.0	83° 0	1920.5	93° 0	2594.0	103° 0	3474.4
10	996.2	10	1405.7	10	1930.4	10	2606.8	10	3491.3
20	1002.3	20	1413.5	20	1940.3	20	2619.7	20	3508.2
30	1008.3	30	1421.2	30	1950.3	30	2632.6	30	3525.2
40	1014.4	40	1429.0	40	1960.2	40	2645.5	40	3542.4
50	1020.5	50	1436.8	50	1970.3	50	2658.5	50	3559.6
64° 0	1026.6	74° 0	1444.6	84° 0	1980.4	94° 0	2671.6	104° 0	3576.8
10	1032.8	10	1452.5	10	1990.5	10	2684.7	10	3594.2
20	1039.0	20	1460.4	20	2000.6	20	2697.9	20	3611.7
30	1045.2	30	1468.4	30	2010.8	30	2711.2	30	3629.2
40	1051.4	40	1476.4	40	2021.1	40	2724.5	40	3646.8
50	1057.7	50	1484.4	50	2031.4	50	2737.9	50	3664.5
65° 0	1063.9	75° 0	1492.4	85° 0	2041.7	95° 0	2751.3	105° 0	3682.3
10	1070.2	10	1500.5	10	2052.1	10	2764.8	10	3700.2
20	1076.6	20	1508.6	20	2062.5	20	2778.3	20	3718.2
30	1082.9	30	1516.7	30	2073.0	30	2792.0	30	3736.2
40	1089.3	40	1524.9	40	2083.5	40	2805.6	40	3754.4
50	1095.7	50	1533.1	50	2094.1	50	2819.4	50	3772.6
66° 0	1102.2	76° 0	1541.4	86° 0	2104.7	96° 0	2833.2	106° 0	3791.0
10	1108.6	10	1549.7	10	2115.3	10	2847.0	10	3809.4
20	1115.1	20	1558.0	20	2126.0	20	2861.0	20	3827.9
30	1121.7	30	1566.3	30	2136.7	30	2875.0	30	3846.5
40	1128.2	40	1574.7	40	2147.5	40	2889.0	40	3865.2
50	1134.8	50	1583.1	50	2158.4	50	2903.1	50	3884.0
67° 0	1141.4	77° 0	1591.6	87° 0	2169.2	97° 0	2917.3	107° 0	3902.9
10	1148.0	10	1600.1	10	2180.2	10	2931.6	10	3921.9
20	1154.7	20	1608.6	20	2191.1	20	2945.9	20	3940.9
30	1161.3	30	1617.1	30	2202.2	30	2960.3	30	3960.1
40	1168.1	40	1625.7	40	2213.2	40	2974.7	40	3979.4
50	1174.8	50	1634.4	50	2224.3	50	2989.2	50	3998.7
68° 0	1181.6	78° 0	1643.0	88° 0	2235.5	98° 0	3003.8	108° 0	4018.0
10	1188.4	10	1651.7	10	2246.7	10	3018.4	10	4037.8
20	1195.2	20	1660.5	20	2258.0	20	3033.1	20	4057.4
30	1202.0	30	1669.2	30	2269.3	30	3047.9	30	4077.2
40	1208.9	40	1678.1	40	2280.6	40	3062.8	40	4097.1
50	1215.8	50	1686.9	50	2292.0	50	3077.7	50	4117.0
69° 0	1222.7	79° 0	1695.8	89° 0	2303.5	99° 0	3092.7	109° 0	4137.1
10	1229.7	10	1704.7	10	2315.0	10	3107.7	10	4157.3
20	1236.7	20	1713.7	20	2326.6	20	3122.9	20	4177.5
30	1243.7	30	1722.7	30	2338.2	30	3138.1	30	4197.9
40	1250.8	40	1731.7	40	2349.8	40	3153.3	40	4218.4
50	1257.8	50	1740.8	50	2361.5	50	3168.7	50	4239.0
70° 0	1265.0	80° 0	1749.9	90° 0	2373.3	100° 0	3184.1	110° 0	4259.7
10	1272.1	10	1759.0	10	2385.1	10	3199.6	10	4280.5
20	1279.3	20	1768.2	20	2397.0	20	3215.1	20	4301.4
30	1286.5	30	1777.4	30	2408.9	30	3230.8	30	4322.4
40	1293.7	40	1786.7	40	2420.9	40	3246.5	40	4343.6
50	1300.9	50	1796.0	50	2432.9	50	3262.3	50	4364.8

TABLE VI.—OFFSETS FROM TANGENT FOR A 10° CURVE.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001
1	001	001	001	001	002	002	002	003	003	003
2	003	004	004	005	005	005	006	006	007	007
3	008	008	009	009	010	011	011	012	013	013
4	014	015	015	016	017	018	018	019	020	021
5	0.022	0.023	0.024	0.024	0.025	0.026	0.027	0.028	0.029	0.030
6	031	032	034	035	036	037	038	039	040	041
7	043	044	045	046	048	049	050	052	053	054
8	056	057	059	060	061	063	064	066	067	069
9	071	072	074	075	077	079	080	082	084	085
10	0.087	0.089	0.091	0.092	0.094	0.096	0.098	0.100	0.102	0.104
11	105	107	109	111	113	115	117	119	121	123
12	126	128	130	132	134	136	138	141	143	145
13	147	150	152	154	156	159	161	164	166	168
14	171	173	176	178	181	183	186	188	191	193
15	0.196	0.199	0.201	0.204	0.207	0.209	0.212	0.215	0.218	0.220
16	223	226	229	232	234	237	240	243	246	249
17	252	255	258	261	264	267	270	273	276	279
18	282	286	289	292	295	298	302	305	308	311
19	315	318	321	325	328	331	335	338	342	345
20	0.349	0.352	0.356	0.359	0.363	0.366	0.370	0.373	0.377	0.381
21	384	388	392	395	399	403	407	410	414	418
22	422	426	430	433	437	441	445	449	453	457
23	461	465	469	473	477	481	485	490	494	498
24	502	506	510	515	519	523	527	532	536	540
25	0.545	0.549	0.553	0.558	0.562	0.567	0.571	0.576	0.580	0.585
26	589	594	598	603	607	612	617	621	626	631
27	635	640	645	650	654	659	664	669	674	678
28	683	688	693	698	703	708	713	718	723	728
29	733	738	743	748	753	758	764	769	774	779
30	0.784	0.790	0.795	0.800	0.805	0.811	0.816	0.821	0.827	0.832
31	838	843	848	854	859	865	870	876	881	887
32	892	898	904	909	915	921	926	932	938	943
33	949	955	961	966	972	978	984	990	996	1.002
34	1.008	1.013	1.019	1.025	1.031	1.037	1.043	1.049	1.055	062
35	1.068	1.074	1.080	1.086	1.092	1.098	1.105	1.111	1.117	1.123
36	130	136	142	148	155	161	167	174	180	187
37	193	200	206	213	219	226	232	239	245	252
38	259	265	272	278	285	292	299	305	312	319
39	326	332	339	346	353	360	367	374	381	388
40	1.394	1.401	1.408	1.415	1.423	1.430	1.437	1.444	1.451	1.458
41	465	472	479	487	494	501	508	516	523	530
42	537	545	552	559	567	574	582	589	597	604
43	611	619	627	634	642	649	657	664	672	680
44	687	695	703	710	718	726	734	741	749	757
45	1.765	1.773	1.781	1.788	1.796	1.804	1.812	1.820	1.828	1.836
46	844	852	860	868	876	885	893	901	909	917
47	925	933	942	950	958	966	975	983	991	2.000
48	2.008	2.016	2.025	2.033	2.042	2.050	2.059	2.067	2.076	084
49	093	101	110	118	127	136	144	153	161	170
50	2.179	2.188	2.196	2.205	2.214	2.223	2.231	2.240	2.249	2.258
51	267	276	285	294	303	312	321	330	339	348
52	357	366	375	384	393	402	411	421	430	439
53	448	457	467	476	485	495	504	513	523	532
54	541	551	560	570	579	589	598	608	617	627
55	2.636	2.646	2.656	2.665	2.675	2.685	2.694	2.704	2.714	2.723
56	733	743	753	763	772	782	792	802	812	822
57	832	842	852	862	872	882	892	902	912	922
58	932	942	952	962	972	983	993	3.003	3.013	3.024
59	3.034	3.044	3.054	3.065	3.075	3.086	3.096	106	117	127
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VI.—OFFSETS FROM TANGENT FOR A 10° CURVE.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
60	3.138	3.148	3.159	3.169	3.180	3.190	3.201	3.211	3.222	3.232
61	243	254	264	275	286	296	307	318	329	339
62	350	361	372	383	394	404	415	426	437	448
63	459	470	481	492	503	514	525	536	548	559
64	570	581	592	603	615	626	637	648	660	671
65	3.682	3.694	3.705	3.716	3.728	3.739	3.751	3.762	3.773	3.785
66	796	808	820	831	843	854	866	877	889	901
67	912	924	936	948	959	971	983	995	4.006	4.018
68	4.030	4.042	4.054	4.066	4.078	4.090	4.101	4.113	125	137
69	149	161	174	186	198	210	222	234	246	258
70	4.271	4.283	4.295	4.307	4.320	4.332	4.344	4.356	4.369	4.381
71	393	406	418	431	443	456	468	481	493	506
72	518	531	543	556	568	581	594	606	619	632
73	644	657	670	683	696	708	721	734	747	760
74	773	786	798	811	824	837	850	863	876	889
75	4.902	4.916	4.929	4.942	4.955	4.968	4.981	4.994	5.008	5.021
76	5.034	5.047	5.061	5.074	5.087	5.101	5.114	5.127	141	154
77	167	181	194	208	221	235	248	262	275	289
78	303	316	330	343	357	371	384	398	412	426
79	439	453	467	481	495	508	522	536	550	564
80	5.578	5.592	5.606	5.620	5.634	5.648	5.662	5.676	5.690	5.704
81	718	732	747	761	775	789	803	818	832	846
82	860	875	889	903	918	932	946	961	975	990
83	6.004	6.019	6.033	6.048	6.062	6.077	6.091	6.106	6.120	6.135
84	150	164	179	194	208	223	238	253	267	282
85	6.297	6.312	6.327	6.341	6.356	6.371	6.386	6.401	6.416	6.431
86	446	461	476	491	506	521	536	551	566	582
87	597	612	627	642	658	673	688	703	719	734
88	749	765	780	795	811	826	842	857	873	888
89	904	919	935	950	966	981	997	7.013	7.028	7.044
90	7.060	7.075	7.091	7.107	7.122	7.138	7.154	7.170	7.186	7.201
91	217	233	249	265	281	297	313	329	345	361
92	377	393	409	425	441	457	473	489	506	522
93	538	554	570	587	603	619	636	652	668	685
94	701	717	734	750	767	783	800	816	833	849
95	7.866	7.882	7.899	7.915	7.932	7.949	7.965	7.982	7.999	8.015
96	8.032	8.049	8.066	8.082	8.099	8.116	8.133	8.150	8.167	184
97	200	217	234	251	268	285	302	319	336	353
98	370	387	405	422	439	456	473	490	508	525
99	542	559	577	594	611	629	646	663	681	698
100	8.716	8.733	8.750	8.768	8.785	8.803	8.820	8.838	8.856	8.873
101	891	908	926	944	961	979	997	9.014	9.032	9.050
102	9.068	9.085	9.103	9.121	9.139	9.157	9.175	192	210	228
103	246	264	282	300	318	336	354	372	390	409
104	427	445	463	481	499	518	536	554	572	591
105	9.609	9.627	9.645	9.664	9.682	9.701	9.719	9.737	9.756	9.774
106	793	811	830	848	867	885	904	923	941	960
107	978	997	10.016	10.034	10.053	10.072	10.091	10.109	10.128	10.147
108	10.166	10.185	203	222	241	260	279	298	317	336
109	355	374	393	412	431	450	469	488	507	527
110	10.546	10.565	10.584	10.603	10.623	10.642	10.661	10.680	10.700	10.719
111	738	758	777	796	816	835	855	874	894	913
112	933	952	972	991	11.011	11.031	11.050	11.070	11.089	11.109
113	11.129	11.149	11.168	11.188	208	228	247	267	287	307
114	327	347	366	386	406	426	446	466	486	506
115	11.526	11.546	11.566	11.586	11.607	11.627	11.647	11.667	11.687	11.707
116	728	748	768	788	809	829	849	870	890	910
117	931	951	971	992	12.012	12.033	12.053	12.074	12.094	12.115
118	12.135	12.156	12.177	12.197	218	239	259	280	301	321
119	342	363	384	404	425	446	467	488	509	529
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VI.—OFFSETS FROM TANGENT FOR A 10° CURVE.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
120	12.550	12.571	12.592	12.613	12.634	12.655	12.676	12.697	12.718	12.739
121	.760	.781	.803	.824	.845	.866	.887	.908	.930	.951
122	.972	.993	13.015	13.036	13.057	13.079	13.100	13.121	13.143	13.164
123	13.186	13.207	.229	.250	.272	.293	.315	.336	.358	.379
124	.401	.423	.444	.466	.488	.509	.531	.553	.574	.596
125	13.618	13.640	13.662	13.683	13.705	13.727	13.749	13.771	13.793	13.815
126	.837	.859	.881	.903	.925	.947	.969	.991	14.013	14.035
127	14.057	14.079	14.102	14.124	14.146	14.168	14.190	14.213	.235	.257
128	.279	.302	.324	.346	.369	.391	.414	.436	.459	.481
129	.503	.526	.548	.571	.594	.616	.639	.661	.684	.707
130	14.729	14.752	14.775	14.797	14.820	14.843	14.865	14.888	14.911	14.934
131	.957	.980	15.002	15.025	15.048	15.071	15.094	15.117	15.140	15.163
132	15.186	15.209	.232	.255	.278	.301	.324	.347	.371	.394
133	.417	.440	.463	.486	.510	.533	.556	.580	.603	.626
134	.650	.673	.696	.720	.743	.767	.790	.813	.837	.860
135	15.884	15.908	15.931	15.955	15.978	16.002	16.026	16.049	16.073	16.096
136	16.120	16.144	16.168	16.191	16.215	.239	.263	.287	.310	.334
137	.358	.382	.406	.430	.454	.478	.502	.526	.550	.574
138	.598	.622	.646	.670	.694	.718	.742	.767	.791	.815
139	.839	.863	.888	.912	.936	.961	.985	17.009	17.034	17.058
140	17.082	17.107	17.131	17.156	17.180	17.205	17.229	17.254	17.278	17.303
141	.327	.352	.376	.401	.426	.450	.475	.500	.524	.549
142	.574	.599	.623	.648	.673	.698	.723	.748	.773	.797
143	.822	.847	.872	.897	.922	.947	.972	.997	18.022	18.047
144	18.072	18.098	18.123	18.148	18.173	18.198	18.223	18.249	.274	.299
145	18.324	18.350	18.375	18.400	18.426	18.451	18.476	18.502	18.527	18.553
146	.578	.603	.629	.654	.680	.705	.731	.757	.782	.808
147	.833	.859	.885	.910	.936	.962	.987	19.013	19.039	19.065
148	19.090	19.116	19.142	19.168	19.194	19.220	19.246	.271	.297	.323
149	.349	.375	.401	.427	.453	.479	.505	.532	.558	.584
150	19.610	19.636	19.662	19.688	19.715	19.741	19.767	19.793	19.820	19.846
151	.872	.899	.925	.951	.978	20.004	20.030	20.057	20.083	20.110
152	20.136	20.163	20.189	20.216	20.242	.269	.296	.322	.349	.375
153	.402	.429	.455	.482	.509	.536	.562	.589	.616	.643
154	.670	.697	.723	.750	.777	.804	.831	.858	.885	.912
155	20.939	20.966	20.993	21.020	21.047	21.074	21.101	21.129	21.156	21.183
156	21.210	21.237	21.264	.292	.319	.346	.374	.401	.428	.455
157	.483	.510	.538	.565	.592	.620	.647	.675	.702	.730
158	.757	.785	.812	.840	.868	.895	.923	.951	.978	22.006
159	22.034	22.061	22.089	22.117	22.145	22.172	22.200	22.228	22.256	.284
160	22.312	22.340	22.367	22.395	22.423	22.451	22.479	22.507	22.535	22.563
161	.591	.620	.648	.676	.704	.732	.760	.788	.817	.845
162	.873	.901	.929	.958	.986	23.014	23.043	23.071	23.099	23.128
163	23.156	23.185	23.213	23.242	23.270	.298	.327	.356	.384	.413
164	.441	.470	.498	.527	.556	.584	.613	.642	.670	.699
165	23.728	23.757	23.786	23.814	23.843	23.872	23.901	23.930	23.959	23.988
166	24.016	24.045	24.074	24.103	24.132	24.161	24.190	24.219	24.248	24.278
167	.307	.336	.365	.394	.423	.452	.482	.511	.540	.569
168	.599	.628	.657	.687	.716	.745	.775	.804	.833	.863
169	.892	.922	.951	.981	25.010	25.040	25.069	25.099	25.129	25.158
170	25.188	25.217	25.247	25.277	25.306	25.336	25.366	25.396	25.425	25.455
171	.485	.515	.545	.574	.604	.634	.664	.694	.724	.754
172	.784	.814	.844	.874	.904	.934	.964	.994	26.024	26.054
173	26.085	26.115	26.145	26.175	26.205	26.236	26.266	26.296	.326	.357
174	.387	.417	.448	.478	.509	.539	.569	.600	.630	.661
175	26.691	26.722	26.752	26.783	26.813	26.844	26.875	26.905	26.936	26.966
176	.997	27.028	27.059	27.089	27.120	27.151	27.182	27.212	27.243	27.274
177	27.305	.336	.367	.397	.428	.459	.490	.521	.552	.583
178	.614	.645	.676	.707	.738	.770	.801	.832	.863	.894
179	.925	.957	.988	28.019	28.050	28.082	28.113	28.144	28.176	28.207
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VI.—OFFSETS FROM TANGENT FOR A 10° CURVE.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
180	28.238	28.270	28.301	28.332	28.364	28.395	28.427	28.458	28.490	28.521
181	553	584	616	648	679	711	742	774	806	838
182	869	901	933	964	996	29.028	29.060	29.092	29.124	29.155
183	29.187	29.219	29.251	29.283	29.315	347	379	411	443	475
184	507	539	571	603	636	668	700	732	764	797
185	29.829	29.861	29.893	29.926	29.958	29.990	30.023	30.055	30.087	30.120
186	30.152	30.185	30.217	30.249	30.282	30.314	347	380	412	445
187	477	510	542	575	608	640	673	706	739	771
188	804	837	870	902	935	968	31.001	31.034	31.067	31.100
189	31.133	31.166	31.199	31.232	31.265	31.298	331	364	397	430
190	31.463	31.496	31.529	31.562	31.596	31.629	31.662	31.695	31.728	31.762
191	795	828	862	895	928	962	995	32.028	32.062	32.095
192	32.129	32.162	32.196	32.229	32.263	32.296	32.330	364	397	431
193	464	498	532	565	599	633	667	700	734	768
194	802	835	869	903	937	971	33.005	33.039	33.073	33.107
195	33.141	33.175	33.209	33.243	33.277	33.311	33.345	33.379	33.413	33.447
196	481	516	550	584	618	653	687	721	755	790
197	824	858	893	927	961	996	34.030	34.065	34.099	34.134
198	34.168	34.203	34.237	34.272	34.306	34.341	376	410	445	480
199	514	549	584	618	653	688	723	757	792	827
200	34.862	34.897	34.932	34.967	35.002	35.037	35.071	35.106	35.141	35.176
201	35.211	35.247	35.282	35.317	352	387	422	457	492	528
202	563	598	633	668	704	739	774	810	845	880
203	916	951	987	36.022	36.057	36.093	36.128	36.164	36.199	36.235
204	36.270	36.306	36.342	377	413	448	484	520	555	591
205	36.627	36.663	36.698	36.734	36.770	36.806	36.842	36.877	36.913	36.949
206	985	37.021	37.057	37.093	37.129	37.165	37.201	37.237	37.273	37.309
207	37.345	381	417	453	490	526	562	598	634	670
208	707	743	779	816	852	888	925	961	997	38.034
209	38.070	38.107	38.143	38.180	38.216	38.253	38.289	38.326	38.362	399
210	38.435	38.472	38.509	38.545	38.582	38.619	38.655	38.692	38.729	38.766
211	802	839	876	913	950	986	39.023	39.060	39.097	39.134
212	39.171	39.208	39.245	39.282	39.319	39.356	393	430	467	504
213	541	578	616	653	690	727	764	802	839	876
214	914	951	988	40.025	40.063	40.100	40.138	40.175	40.212	40.250
215	40.287	40.325	40.362	40.400	40.437	40.475	40.513	40.550	40.588	40.625
216	663	701	738	776	814	852	889	927	965	41.003
217	41.040	41.078	41.116	41.154	41.192	41.230	41.268	41.306	41.344	41.382
218	420	458	496	534	572	610	648	686	724	762
219	800	839	877	915	953	991	42.030	42.068	42.106	42.145
220	42.183	42.221	42.260	42.298	42.337	42.375	42.413	42.452	42.490	42.529
221	567	606	644	683	722	760	799	837	876	915
222	953	992	43.031	43.070	43.108	43.147	43.186	43.225	43.264	43.302
223	43.341	43.380	419	458	497	536	575	614	653	692
224	731	770	809	848	887	926	965	44.005	44.044	44.083
225	44.122	44.161	44.201	44.240	44.279	44.319	44.358	44.397	44.437	44.476
226	515	555	594	634	673	712	752	791	831	871
227	910	950	989	45.029	45.069	45.108	45.148	45.188	45.227	45.267
228	45.307	45.346	45.386	426	466	506	545	585	625	665
229	705	745	785	825	865	905	945	985	46.025	46.065
230	46.105	46.145	46.185	46.225	46.265	46.306	46.346	46.386	46.426	46.467
231	507	547	587	628	668	708	749	789	829	870
232	910	951	991	47.032	47.072	47.113	47.153	47.194	47.234	47.275
233	47.316	47.356	47.397	437	478	519	560	600	641	682
234	723	763	804	845	886	927	968	48.009	48.049	48.090
235	48.131	48.172	48.213	48.254	48.295	48.336	48.377	48.419	48.460	48.501
236	542	583	624	665	707	748	789	830	872	913
237	954	995	49.037	49.078	49.119	49.161	49.202	49.244	49.285	49.327
238	49.368	49.410	451	493	534	576	617	659	701	742
239	784	825	867	909	.951	992	50.034	50.076	50.118	50.159
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VI.—OFFSETS FROM TANGENT FOR A 10° CURVE.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
240	50.201	50.243	50.285	50.327	50.369	50.411	50.453	50.495	50.537	50.578
241	620	663	705	747	789	831	873	915	957	999
242	51.041	51.084	51.126	51.168	51.210	51.253	51.295	51.337	51.379	51.422
243	464	507	549	591	634	676	719	761	804	846
244	889	931	974	52.016	52.059	52.101	52.144	52.187	52.229	52.272
245	52.315	52.358	52.400	52.443	52.486	52.529	52.571	52.614	52.657	52.700
246	743	786	829	871	914	957	53.000	53.043	53.086	53.129
247	53.172	53.215	53.259	53.302	53.345	53.388	431	474	517	561
248	604	647	690	734	777	820	863	907	950	994
249	54.037	54.080	54.124	54.167	54.211	54.254	54.298	54.341	54.385	54.428
250	54.472	54.515	54.559	54.603	54.646	54.690	54.734	54.777	54.821	54.865
251	909	952	996	55.040	55.084	55.127	55.171	55.215	55.259	55.303
252	55.347	55.391	55.435	479	523	567	611	655	699	743
253	787	831	875	919	964	56.008	56.052	56.096	56.140	56.185
254	56.229	56.273	56.318	56.362	56.406	451	495	539	584	628
255	56.673	56.717	56.761	56.806	56.850	56.895	56.940	56.984	57.029	57.073
256	57.118	57.163	57.207	57.252	57.297	57.341	57.386	57.431	475	520
257	565	610	655	699	744.	789	834	879	924	969
258	58.014	58.059	58.104	58.149	58.194	58.239	58.284	58.329	58.374	58.419
259	464	510	555	600	645	690	736	781	826	871
260	58.917	58.962	59.007	59.053	59.098	59.144	59.189	59.234	59.280	59.325
261	59.371	59.416	462	507	553	599	644	690	735	781
262	827	872	918	964	60.009	60.055	60.101	60.147	60.193	60.238
263	60.284	60.330	60.376	60.422	468	514	560	606	652	698
264	744	790	836	882	928	974	61.020	61.066	61.112	61.158
265	61.205	61.251	61.297	61.343	61.390	61.436	61.482	61.528	61.575	61.621
266	667	714	760	807	853	899	946	992	62.039	62.085
267	62.132	62.178	62.225	62.272	62.318	62.365	62.411	62.458	505	552
268	598	645	692	738	785	832	879	926	972	63.019
269	63.066	63.113	63.160	63.207	63.254	63.301	63.348	63.395	63.442	489
270	63.536	63.583	63.630	63.677	63.724	63.772	63.819	63.866	63.913	63.960
271	64.008	64.055	64.102	64.149	64.197	64.244	64.291	64.339	64.386	64.433
272	481	528	576	623	671	718	766	813	861	908
273	956	65.003	65.051	65.099	65.146	65.194	65.242	65.289	65.337	65.385
274	65.432	480	528	576	624	672	719	767	815	863
275	65.911	65.959	66.007	66.055	66.103	66.151	66.199	66.247	66.295	66.343
276	66.391	66.439	487	536	584	632	680	728	777	825
277	873	921	970	67.018	67.066	67.115	67.163	67.212	67.260	67.308
278	67.357	67.405	67.454	502	551	599	648	697	745	794
279	842	891	940	988	68.037	68.086	68.134	68.183	68.232	68.281
280	68.330	68.378	68.427	68.476	68.525	68.574	68.623	68.672	68.721	68.769
281	818	867	916	965	69.015	69.064	69.113	69.162	69.211	69.260
282	69.309	69.358	69.407	69.457	506	555	604	654	703	752
283	802	851	900	950	999	70.048	70.098	70.147	70.197	70.246
284	70.296	70.345	70.395	70.444	70.494	543	593	643	692	742
285	70.792	70.841	70.891	70.941	70.991	71.040	71.090	71.140	71.190	71.239
286	71.289	71.339	71.389	71.439	71.489	539	589	639	689	739
287	789	839	889	939	989	72.039	72.089	72.139	72.189	72.240
288	72.290	72.340	72.390	72.441	72.491	541	591	642	692	742
289	793	843	894	944	994	73.045	73.095	73.146	73.196	73.247
290	73.297	73.348	73.398	73.449	73.500	73.550	73.601	73.652	73.702	73.753
291	804	854	905	956	74.007	74.058	74.108	74.159	74.210	74.261
292	74.312	74.363	74.414	74.465	516	567	618	669	720	771
293	822	873	924	975	75.026	75.077	75.128	75.180	75.231	75.282
294	75.333	75.385	75.436	75.487	538	590	641	692	744	795
295	75.847	75.898	75.950	76.001	76.052	76.104	76.155	76.207	76.259	76.310
296	76.362	76.413	76.465	517	568	620	672	723	775	827
297	879	930	982	77.034	77.086	77.138	77.189	77.241	77.293	77.345
298	77.397	77.449	77.501	553	605	657	709	761	813	865
299	917	970	78.022	78.074	78.126	78.178	78.230	78.283	78.335	78.386
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VII.—ANGLES PROPORTIONAL TO SQUARES OF DISTA

M.	.1	.2	.3	.4	.5	.6	.7	.8	.9
1	0	0	0	0	0	0.5	0.5	0.5	1
2	0	0	0	0.5	0.5	0.5	1	1.5	1.5
3	0	0	0.5	0.5	1	1	1.5	2	2.5
4	0	0	0.5	0.5	1	1.5	2	2.5	3
5	0	0	0.5	1	1	2	2.5	3	4
6	0	0	0.5	1	1.5	2	3	4	5
7	0	0.5	0.5	1	2	2.5	3.5	4.5	5.5
8	0	0.5	0.5	1.5	2	3	4	5	6.5
9	0	0.5	1	1.5	2	3	4.5	6	7.5
10	0	0.5	1	1.5	2.5	3.5	5	6.5	8
11	0	0.5	1	2	3	4	5.5	7	9
12	0	0.5	1	2	3	4.5	6	7.5	9.5
13	0	0.5	1	2	3	4.5	6.5	8.5	10.5
14	0	0.5	1.5	2	3.5	5	7	9	11.5
15	0	0.5	1.5	2.5	4	5.5	7.5	9.5	12
16	0	0.5	1.5	2.5	4	6	8	10	13
17	0	0.5	1.5	2.5	4	6	8.5	11	14
18	0	0.5	1.5	3	4.5	6.5	9	11.5	14.5
19	0	1	1.5	3	5	7	9.5	12	15.5
20	0	1	2	3	5	7	10	13	16
21	0	1	2	3.5	5	7.5	10.5	13.5	17
22	0	1	2	3.5	5.5	8	11	14	18
23	0	1	2	3.5	6	8.5	11.5	14.5	18.5
24	0	1	2	4	6	8.5	12	15.5	19.5
25	0	1	2	4	6	9	12	16	20
26	0.5	1	2.5	4	6.5	9.5	12.5	16.5	21
27	0.5	1	2.5	4.5	7	9.5	13	17.5	22
28	0.5	1	2.5	4.5	7	10	13.5	18	22.5
29	0.5	1	2.5	4.5	7	10.5	14	18.5	23.5
30	0.5	1	2.5	5	7.5	11	14.5	19	24.5
31	0.5	1	3	5	8	11	15	20	25
32	0.5	1.5	3	5	8	11.5	15.5	20.5	26
33	0.5	1.5	3	5.5	8	12	16	21	26.5
34	0.5	1.5	3	5.5	8.5	12	16.5	22	27.5
35	0.5	1.5	3	5.5	9	12.5	17	22.5	28.5
36	0.5	1.5	3	6	9	13	17.5	23	29
37	0.5	1.5	3.5	6	9	13.5	18	23.5	30
38	0.5	1.5	3.5	6	9.5	13.5	18.5	24.5	31
39	0.5	1.5	3.5	6	10	14	19	25	31.5
40	0.5	1.5	3.5	6.5	10	14.5	19.5	25.5	32.5
41	0.5	1.5	3.5	6.5	10	15	20	26	33
42	0.5	1.5	4	6.5	10.5	15	20.5	27	34
43	0.5	1.5	4	7	11	15.5	21	27.5	35
44	0.5	2	4	7	11	16	21.5	28	35.5
45	0.5	2	4	7	11	16	22	29	36.5
46	0.5	2	4	7.5	11.5	16.5	22.5	29.5	37.5
47	0.5	2	4	7.5	12	17	23	30	38
48	0.5	2	4.5	7.5	12	17.5	23.5	30.5	39
49	0.5	2	4.5	8	12	17.5	24	31.5	39.5
50	0.5	2	4.5	8	12.5	18	24.5	32	40.5
51	0.5	2	4.5	8	13	18.5	25	32.5	41.5
52	0.5	2	4.5	8.5	13	18.5	25.5	33.5	42
53	0.5	2	5	8.5	13	19	26	34	43
54	0.5	2	5	8.5	13.5	19.5	26.5	34.5	43.5
55	0.5	2	5	9	14	20	27	35	44.5
56	0.5	2	5	9	14	20	27.5	36	45.5
57	0.5	2.5	5	9	14	20.5	28	36.5	46
58	0.5	2.5	5	9.5	14.5	21	28.5	37	47
59	0.5	2.5	5.5	9.5	15	21	29	38	48
60	0.5	2.5	5.5	9.5	15	21.5	29.5	38.5	48.5
	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VII.—ANGLES PROPORTIONAL TO SQUARES OF DISTANCES.

M.	.1	.2	.3	.4	.5	.6	.7	.8	.9	M.
61	.5	2.5	5.5	10	15	22	30	39	49.5	61
62	.5	2.5	5.5	10	15.5	22.5	30.5	39.5	50	62
63	.5	2.5	5.5	10	16	22.5	31	40.5	51	63
64	.5	2.5	6	10	16	23	31.5	41	52	64
65	.5	2.5	6	10.5	16	23.5	32	41.5	52.5	65
66	.5	2.5	6	10.5	16.5	24	32.5	42	53.5	66
67	.5	2.5	6	10.5	17	24	33	43	54.5	67
68	.5	2.5	6	11	17	24.5	33.5	43.5	55	68
69	.5	3	6	11	17	25	34	44	56	69
70	.5	3	6.5	11	17.5	25	34.5	45	56.5	70
71	.5	3	6.5	11.5	18	25.5	35	45.5	57.5	71
72	.5	3	6.5	11.5	18	26	35.5	46	58.5	72
73	.5	3	6.5	11.5	18	26.5	36	46.5	59	73
74	.5	3	6.5	12	18.5	26.5	36.5	47.5	60	74
75	1	3	7	12	19	27	37	48	61	75
76	1	3	7	12	19	27.5	37	48.5	61.5	76
77	1	3	7	12.5	19	27.5	37.5	49.5	62.5	77
78	1	3	7	12.5	19.5	28	38	50	63	78
79	1	3	7	12.5	20	28.5	38.5	50.5	64	79
80	1	3	7	13	20	29	39	51	65	80
81	1	3	7.5	13	20	29	39.5	52	65.5	81
82	1	3.5	7.5	13	20.5	29.5	40	52.5	66.5	82
83	1	3.5	7.5	13.5	21	30	40.5	53	67	83
84	1	3.5	7.5	13.5	21	30	41	54	68	84
85	1	3.5	7.5	13.5	21	30.5	41.5	54.5	69	85
86	1	3.5	7.5	14	21.5	31	42	55	69.5	86
87	1	3.5	8	14	22	31.5	42.5	55.5	70.5	87
88	1	3.5	8	14	22	31.5	43	56.5	71.5	88
89	1	3.5	8	14	22	32	43.5	57	72	89
90	1	3.5	8	14.5	22,5	32.5	44	57.5	73	90
91	1	3.5	8	14.5	23	33	44.5	58	73.5	91
92	1	3.5	8.5	14.5	23	33	45	59	74.5	92
93	1	3.5	8.5	15	23	33.5	45.5	59.5	75.5	93
94	1	4	8.5	15	23.5	34	46	60	76	94
95	1	4	8.5	15	24	34	46.5	61	77	95
96	1	4	8.5	15.5	24	34.5	47	61.5	78	96
97	1	4	8.5	15.5	24	35	47.5	62	78.5	97
98	1	4	9	15.5	24.5	35.5	48	62.5	79.5	98
99	1	4	9	16	25	35.5	48.5	63.5	80	99
100	1	4	9	16	25	36	49	64	81	100
101	1	4	9	16	25	36.5	49.5	64.5	82	101
102	1	4	9	16.5	25.5	36.5	50	65.5	82.5	102
103	1	4	9.5	16.5	26	37	50.5	66	83.5	103
104	1	4	9.5	16.5	26	37.5	51	66.5	84	104
105	1	4	9.5	17	26	38	51.5	67	85	105
106	1	4	9.5	17	26.5	38	52	68	86	106
107	1	4.5	9.5	17	27	38.5	52.5	68.5	86.5	107
108	1	4.5	9.5	17.5	27	39	53	69	87.5	108
109	1	4.5	10	17.5	27	39	53.5	70	88.5	109
110	1	4.5	10	17.5	27.5	39.5	54	70.5	89	110
111	1	4.5	10	18	28	40	54.5	71	90	111
112	1	4.5	10	18	28	40.5	55	71.5	90.5	112
113	1	4.5	10	18	28	40.5	55.5	72.5	91.5	113
114	1	4.5	10.5	18	28.5	41	56	73	92.5	114
115	1	4.5	10.5	18.5	29	41.5	56.5	73.5	93	115
116	1	4.5	10.5	18.5	29	42	57	74	94	116
117	1	4.5	10.5	18.5	29	42	57.5	75	95	117
118	1	4.5	10.5	19	29.5	42.5	58	75.5	95.5	118
119	1	5	10.5	19	30	43	58.5	76	96.5	119
120	1	5	11	19	30	43	59	77	97	120
	.1	.2	.3	.4	.5	.6	.7	.8	9.	

TABLE VII.—ANGLES PROPORTIONAL TO SQUARES OF DISTANCE

M.	.1	.2	.3	.4	.5	.6	.7	.8	.9	M.
121	1	5	11	19.5	30	43.5	59.5	77.5	98	121
122	1	5	11	19.5	30.5	44	60	78	99	122
123	1	5	11	19.5	31	44.5	60.5	78.5	99.5	123
124	1	5	11	20	31	44.5	61	79.5	100.5	124
125	1	5	11	20	31	45	61	80	101	125
126	1.5	5	11.5	20	31.5	45.5	61.5	80.5	102	126
127	1.5	5	11.5	20.5	32	45.5	62	81.5	103	127
128	1.5	5	11.5	20.5	32	46	62.5	82	103.5	128
129	1.5	5	11.5	20.5	32	46.5	63	82.5	104.5	129
130	1.5	5	11.5	21	32.5	47	63.5	83	105.5	130
131	1.5	5	12	21	33	47	64	84	106	131
132	1.5	5.5	12	21	33	47.5	64.5	84.5	107	132
133	1.5	5.5	12	21.5	33	48	65	85	107.5	133
134	1.5	5.5	12	21.5	33.5	48	65.5	86	108.5	134
135	1.5	5.5	12	21.5	34	48.5	66	86.5	109.5	135
136	1.5	5.5	12	22	34	49	66. 5	87	110	136
137	1.5	5.5	12.5	22	34	49.5	67	87.5	111	137
138	1.5	5.5	12.5	22	34.5	49.5	67.5	88.5	112	138
139	1.5	5.5	12.5	22	35	50	68	89	112.5	139
140	1.5	5.5	12.5	22.5	35	50.5	68.5	89.5	113.5	140
141	1.5	5.5	12.5	22.5	35	51	69	90	114	141
142	1.5	5.5	13	22.5	35.5	51	69.5	91	115	142
143	1.5	5.5	13	23	36	51.5	70	91.5	116	143
144	1.5	6	13	23	36	52	70.5	92	116.5	144
145	1.5	6	13	23	36	52	71	93	117.5	145
146	1.5	6	13	23.5	36.5	52.5	71.5	93.5	118.5	146
147	1.5	6	13	23.5	37	53	72	94	119	147
148	1.5	6	13.5	23.5	37	53.5	72.5	94.5	120	148
149	1.5	6	13.5	24	37	53.5	73	95.5	120.5	149
150	1.5	6	13.5	24	37.5	54	73.5	96	121.5	150
151	1.5	6	13.5	24	38	54.5	74	96.5	122.5	151
152	1.5	6	13.5	24.5	38	54.5	74.5	97.5	123	152
153	1.5	6	14	24.5	38	55	75	98	124	153
154	1.5	6	14	24.5	38.5	55.5	75.5	98.5	124.5	154
155	1.5	6	14	25	39	56	76	99	125.5	155
156	1.5	6	14	25	39	56	76.5	100	126.5	156
157	1.5	6.5	14	25	39	56.5	77	100.5	127	157
158	1.5	6.5	14	25.5	39.5	57	77.5	101	128	158
159	1.5	6.5	14.5	25.5	40	57	78	102	129	159
160	1.5	6.5	14.5	25.5	40	57.5	78.5	102.5	129.5	160
161	1.5	6.5	14.5	26	40	58	79	103	130.5	161
162	1.5	6.5	14.5	26	40.5	58.5	79.5	103.5	131	162
163	1.5	6.5	14.5	26	41	58.5	80	104.5	132	163
164	1.5	6.5	15	26	41	59	80.5	105	133	164
165	1.5	6.5	15	26.5	41	59.5	81	105.5	133.5	165
166	1.5	6.5	15	26.5	41.5	60	81.5	106	134.5	166
167	1.5	6.5	15	26.5	42	60	82	107	135.5	167
168	1.5	6.5	15	27	42	60.5	82.5	107.5	136	168
169	1.5	7	15	27	42	61	83	108	137	169
170	1.5	7	15.5	27	42.5	61	83.5	109	137.5	170
171	1.5	7	15.5	27.5	43	61.5	84	109.5	138.5	171
172	1.5	7	15.5	27.5	43	62	84.5	110	139.5	172
173	1.5	7	15.5	27.5	43	62.5	85	110.5	140	173
174	1.5	7	15.5	28	43.5	62.5	85.5	111.5	141	174
175	2	7	16	28	44	63	86	112	142	175
176	2	7	16	28	44	63.5	86	112.5	142.5	176
177	2	7	16	28.5	44	63.5	86.5	113.5	143.5	177
178	2	7	16	28.5	44.5	64	87	114	144	178
179	2	7	16	28.5	45	64.5	87.5	114.5	145	179
180	2	7	16	29	45	65	88	115	146	180
	.1	.2	.3	.4	.5	.6	.7	.8	.9	

ABLE VII.—ANGLES PROPORTIONAL TO SQUARES OF DISTANCES.

M.	.1	.2	.3	.4	.5	.6	.7	.8	.9	M.
181	2	7	16.5	29	45	65	88.5	116	146.5	181
182	2	7.5	16.5	29	45.5	65.5	89	116.5	147.5	182
183	2	7.5	16.5	29.5	46	66	89.5	117	148	183
184	2	7.5	16.5	29.5	46	66	90	118	149	184
185	2	7.5	16.5	29.5	46	66.5	90.5	118.5	150	185
186	2	7.5	16.5	30	46.5	67	91	119	150.5	186
187	2	7.5	17	30	47	67.5	91.5	119.5	151.5	187
188	2	7.5	17	30	47	67.5	92	120.5	152.5	188
189	2	7.5	17	30	47	68	92.5	121	153	189
190	2	7.5	17	30.5	47.5	68.5	93	121.5	154	190
191	2	7.5	17	30.5	48	69	93.5	122	154.5	191
192	2	7.5	17.5	30.5	48	69	94	123	155.5	192
193	2	7.5	17.5	31	48	69.5	94.5	123.5	156.5	193
194	2	8	17.5	31	48.5	70	95	124	157	194
195	2	8	17.5	31	49	70	95.5	125	158	195
196	2	8	17.5	31.5	49	70.5	96	125.5	159	196
197	2	8	17.5	31.5	49	71	96.5	126	159.5	197
198	2	8	18	31.5	49.5	71.5	97	126.5	160.5	198
199	2	8	18	32	50	71.5	97.5	127.5	161	199
200	2	8	18	32	50	72	98	128	162	200
201	2	8	18	32	50	72.5	98.5	128.5	163	201
202	2	8	18	32.5	50.5	72.5	99	129.5	163.5	202
203	2	8	18.5	32.5	51	73	99.5	130	164.5	203
204	2	8	18.5	32.5	51	73.5	100	130.5	165	204
205	2	8	18.5	33	51	74	100.5	131	166	205
206	2	8	18.5	33	51.5	74	101	132	167	206
207	2	8.5	18.5	33	52	74.5	191.5	132.5	167.5	207
208	2	8.5	18.5	33.5	52	75	102	133	168.5	208
209	2	8.5	19	33.5	52	75	102.5	134	169.5	209
210	2	8.5	19	33.5	52.5	75.5	103	134.5	170	210
211	2	8.5	19	34	53	76	103.5	135	171	211
212	2	8.5	19	34	53	76.5	104	135.5	171.5	212
213	2	8.5	19	34	53	76.5	104.5	136.5	172.5	213
214	2	8.5	19.5	34	53.5	77	105	137	173.5	214
215	2	8.5	19.5	34.5	54	77.5	105.5	137.5	174	215
216	2	8.5	19.5	34.5	54	78	106	138	175	216
217	2	8.5	19.5	34.5	54	78	106.5	139	176	217
218	2	8.5	19.5	35	54.5	78.5	107	139.5	176.5	218
219	2	9	19.5	35	55	79	107.5	140	177.5	219
220	2	9	20	35	55	79	108	141	178	220
221	2	9	20	35.5	55	79.5	108.5	141.5	179	221
222	2	9	20	35.5	55.5	80	109	142	180	222
223	2	9	20	35.5	56	80.5	109.5	142.5	180.5	223
224	2	9	20	36	56	80.5	110	143.5	181.5	224
225	2	9	20	36	56	81	110	144	182	225
226	2.5	9	20.5	36	56.5	81.5	110.5	144.5	183	226
227	2.5	9	20.5	36.5	57	81.5	111	145.5	184	227
228	2.5	9	20.5	36.5	57	82	111.5	146	184.5	228
229	2.5	9	20.5	36.5	57	82.5	112	146.5	185.5	229
230	2.5	9	20.5	37	57.5	83	112.5	147	186.5	230
231	2.5	9	21	37	58	83	113	148	187	231
232	2.5	9.5	21	37	58	83.5	113.5	148.5	188	232
233	2.5	9.5	21	37.5	58	84	114	149	188.5	233
234	2.5	9.5	21	37.5	58.5	84	114.5	150	189.5	234
235	2.5	9.5	21	37.5	59	84.5	115	150.5	190.5	235
236	2.5	9.5	21	38	59	85	115.5	151	191	236
237	2.5	9.5	21.5	38	59	85.5	116	151.5	192	237
238	2.5	9.5	21.5	38	59.5	85.5	116.5	152.5	193	238
239	2.5	9.5	21.5	38	60	86	117	153	193.5	239
240	2.5	9.5	21.5	38.5	60	86.5	117.5	153.5	194.5	240
	.1	.2	.3	.4	.5	.6	.7	.8	.9	

TABLE VII.—ANGLES PROPORTIONAL TO SQUARES OF DISTA

M.	.1	.2	.3	.4	.5	.6	.7	.8	.9
241	2.5	9.5	21.5	38.5	60	87	118	154	195
242	2.5	9.5	22	38.5	60.5	87	118.5	155	196
243	2.5	9.5	22	39	61	87.5	119	155.5	197
244	2.5	10	22	39	61	88	119.5	156	197.5
245	2.5	10	22	39	61	88	120	157	198.5
246	2.5	10	22	39.5	61.5	88.5	120.5	157.5	199.5
247	2.5	10	22	39.5	62	89	121	158	200
248	2.5	10	22.5	39.5	62	89.5	121.5	158.5	201
249	2.5	10	22.5	40	62	89.5	122	159.5	201.5
250	2.5	10	22.5	40	62.5	90	122.5	160	202.5
251	2.5	10	22.5	40	63	90.5	123	160.5	203.5
252	2.5	10	22.5	40.5	63	90.5	123.5	161.5	204
253	2.5	10	23	40.5	63	91	124	162	205
254	2.5	10	23	40.5	63.5	91.5	124.5	162.5	205.5
255	2.5	10	23	41	64	92	125	163	206.5
256	2.5	10	23	41	64	92	125.5	164	207.5
257	2.5	10.5	23	41	64	92.5	126	164.5	208
258	2.5	10.5	23	41.5	64.5	93	126.5	165	209
259	2.5	10.5	23.5	41.5	65	93	127	166	210
260	2.5	10.5	23.5	41.5	65	93.5	127.5	166.5	210.5
261	2.5	10.5	23.5	42	65	94	128	167	211.5
262	2.5	10.5	23.5	42	65.5	94.5	128.5	167.5	212
263	2.5	10.5	23.5	42	66	94.5	129	168.5	213
264	2.5	10.5	24	42	66	95	129.5	169	214
265	2.5	10.5	24	42.5	66	95.5	130	169.5	214.5
266	2.5	10.5	24	42.5	66.5	96	130.5	170	215.5
267	2.5	10.5	24	42.5	67	96	131	171	216.5
268	2.5	10.5	24	43	67	96.5	131.5	171.5	217
269	2.5	11	24	43	67	97	132	172	218
270	2.5	11	24.5	43	67.5	97	132.5	173	218.5
271	2.5	11	24.5	43.5	68	97.5	133	173.5	219.5
272	2.5	11	24.5	43.5	68	98	133.5	174	220.5
273	2.5	11	24.5	43.5	68	98.5	134	174.5	221
274	2.5	11	24.5	44	68.5	98.5	134.5	175.5	222
275	3	11	25	44	69	99	135	176	223
276	3	11	25	44	69	99.5	135	176.5	223.5
277	3	11	25	44.5	69	99.5	135.5	177.5	224.5
278	3	11	25	44.5	69.5	100	136	178	225
279	3	11	25	44.5	70	100.5	136.5	178.5	226
280	3	11	25	45	70	101	137	179	227
281	3	11	25.5	45	70	101	137.5	180	227.5
282	3	11.5	25.5	45	70.5	101.5	138	180.5	228.5
283	3	11.5	25.5	45.5	71	102	138.5	181	229
284	3	11.5	25.5	45.5	71	102	139	182	230
285	3	11.5	25.5	45.5	71	102.5	139.5	182.5	231
286	3	11.5	25.5	46	71.5	103	140	183	231.5
287	3	11.5	26	46	72	103.5	140.5	183.5	232.5
288	3	11.5	26	46	72	103.5	141	184.5	233.5
289	3	11.5	26	46	72	104	141.5	185	234
290	3	11.5	26	46.5	72.5	104.5	142	185.5	235
291	3	11.5	26	46.5	73	105	142.5	186	235.5
292	3	11.5	26.5	46.5	73	105	143	187	236.5
293	3	11.5	26.5	47	73	105.5	143.5	187.5	237.5
294	3	12	26.5	47	73.5	106	144	188	238
295	3	12	26.5	47	74	106	144.5	189	239
296	3	12	26.5	47.5	74	106.5	145	189.5	240
297	3	12	26.5	47.5	74	107	145.5	190	240.5
298	3	12	27	47.5	74.5	107.5	146	190.5	241.5
299	3	12	27	48	75	107.5	146.5	191.5	242
300	3	12	27	48	75	108	147	192	243
	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE VIII.—LONG CHORDS AND ACTUAL ARCS.

Degree of Curve.	Actual Arc, One Station.	LONG CHORDS.							Degree of Curve.
		2 Sta.	3 Sta.	4 Sta.	5 Sta.	6 Sta.	7 Sta.	8 Sta.	
0° 10′	100.000	200.0	300.0	400.0	500.0	600.0	700.0	800.0	0° 10′
20	000	00.0	00.0	00.0	00.0	00.0	00.0	799.9	20
30	000	00.0	00.0	00.0	00.0	599.9	699.9	99.8	30
40	001	00.0	00.0	00.0	499.9	99.9	99.8	99.7	40
50	001	00.0	00.0	399.9	99.9	99.8	99.7	99.6	50
1° 0	100.001	200.0	300.0	399.9	499.8	599.7	699.6	799.4	1° 0
10	002	00.0	00.0	99.9	99.8	99.6	99.4	99.1	10
20	002	00.0	299.9	99.9	99.7	99.5	99.2	98.9	20
30	003	00.0	99.9	99.8	99.7	99.4	99.0	98.6	30
40	004	00.0	99.9	99.8	99.6	99.3	98.8	98.2	40
50	004	00.0	99.9	99.7	99.5	99.1	98.6	97.9	50
2° 0	100.005	200.0	299.9	399.7	499.4	598.9	698.3	797.4	2° 0
10	006	00.0	99.9	99.6	99.3	98.7	98.0	97.0	10
20	007	00.0	99.8	99.6	99.2	98.5	97.7	96.5	20
30	008	00.0	99.8	99.5	99.0	98.3	97.3	96.0	30
40	009	199.9	99.8	99.5	98.9	98.1	97.0	95.5	40
50	010	99.9	99.8	99.4	98.8	97.9	96.6	94.9	50
3° 0	100.011	199.9	299.7	399.3	498.6	597.6	696.2	794.3	3° 0
10	013	99.9	99.7	99.2	98.5	97.3	95.7	93.6	10
20	014	99.9	99.7	99.2	98.3	97.0	95.3	92.9	20
30	016	99.9	99.6	99.1	98.1	96.7	94.8	92.2	30
40	017	99.9	99.6	99.0	98.0	96.4	94.3	91.4	40
50	019	99.9	99.6	98.9	97.8	96.1	93.7	90.6	50
4° 0	100.020	199.9	299.5	398.8	497.6	595.7	693.2	789.8	4° 0
10	022	99.9	99.5	98.7	97.4	95.4	92.6	88.9	10
20	024	99.9	99.4	98.6	97.1	95.0	92.0	88.0	20
30	026	99.8	99.4	98.5	96.9	94.6	91.4	87.1	30
40	028	99.8	99.3	98.3	96.7	94.2	90.7	86.1	40
50	030	99.8	99.3	98.2	96.4	93.8	90.1	85.1	50
5° 0	100.032	199.8	299.2	398.1	496.2	593.4	689.4	784.1	5° 0
10	034	99.8	99.2	98.0	95.9	92.9	88.7	83.0	10
20	036	99.8	99.1	97.8	95.7	92.4	87.9	81.9	20
30	038	99.8	99.1	97.7	95.4	92.0	87.2	80.8	30
40	041	99.8	99.0	97.6	95.1	91.5	86.4	79.6	40
50	043	99.7	99.0	97.4	94.8	91.0	85.6	78.4	50
6° 0	100.046	199.7	298.9	397.3	494.5	590.4	684.7	777.2	6° 0
10	048	99.7	98.8	97.1	94.2	89.9	83.9	75.9	10
20	051	99.7	98.8	97.0	93.9	89.4	83.0	74.6	20
30	054	99.7	98.7	96.8	93.6	88.8	82.1	73.2	30
40	056	99.7	98.6	96.6	93.3	88.2	81.2	71.9	40
50	059	99.6	98.6	96.5	92.9	87.6	80.3	70.5	50
7° 0	100.062	199.6	298.5	396.3	492.6	587.0	679.3	769.0	7° 0
10	065	99.6	98.4	96.1	92.2	86.4	78.3	67.5	10
20	068	99.6	98.4	95.9	91.8	85.8	77.3	66.0	20
30	071	99.6	98.3	95.7	91.5	85.1	76.3	64.5	30
40	075	99.6	98.2	95.5	91.1	84.5	75.2	62.9	40
50	078	99.5	98.1	95.3	90.7	83.8	74.1	61.3	50
8° 0	100.081	199.5	298.1	395.1	490.3	583.1	673.0	759.7	8° 0
10	085	99.5	98.0	94.9	89.9	82.4	71.9	58.0	10
20	088	99.5	97.9	94.7	89.5	81.7	70.7	56.3	20
30	092	99.5	97.8	94.5	89.1	80.9	69.6	54.6	30
40	095	99.4	97.7	94.3	88.6	80.2	68.4	52.8	40
50	099	99.4	97.6	94.1	88.2	79.4	67.2	51.0	50
9° 0	100.103	199.4	297.5	393.9	487.7	578.6	666.0	749.2	9° 0
10	107	99.4	97.4	93.6	87.3	77.8	64.7	47.3	10
20	111	99.3	97.4	93.4	86.8	77.0	63.4	45.4	20
30	115	99.3	97.3	93.2	86.4	76.2	62.1	43.5	30
40	119	99.3	97.2	92.9	85.9	75.4	60.8	41.5	40
50	123	99.3	97.1	92.7	85.4	74.5	59.5	39.5	50
10° 0	100.127	199.2	297.0	392.4	484.9	573.7	658.1	737.5	10° 0
Degree	Actual Arc. .	2 Sta.	3 Sta.	4 Sta.	5 Sta.	6 Sta.	7 Sta.	8 Sta.	Degree

TABLE VIII.—LONG CHORDS AND ACTUAL ARCS.

Degree of Curve.	Actual Arc, One Station.	LONG CHORDS.							Degree of Curve.
		2 Sta.	3 Sta.	4 Sta.	5 Sta.	6 Sta.	7 Sta.	8 Sta.	
10° 0′	100.127	199.2	297.0	392.4	484.9	573.7	658.1	737.5	10° 0′
10	131	99.2	96.9	92.2	84.4	72.8	56.7	35.5	10
20	136	99.2	96.8	91.9	83.9	71.9	55.3	33.4	20
30	140	99.2	96.7	91.7	83.4	71.0	53.9	31.3	30
40	145	99.1	96.5	91.4	82.8	70.1	52.4	29.1	40
50	149	99.1	96.4	91.1	82.3	69.2	51.0	27.0	50
11° 0	100.154	199.1	296.3	390.8	481.8	568.2	649.5	724.8	11° 0
10	158	99.1	96.2	90.6	81.2	67.3	48.0	22.5	10
20	163	99.0	96.1	90.3	80.7	66.3	46.5	20.3	20
30	168	99.0	96.0	90.0	80.1	65.3	44.9	18.0	30
40	173	99.0	95.9	89.7	79.5	64.3	43.3	15.7	40
50	178	98.9	95.7	89.4	78.9	63.3	41.8	13.3	50
12° 0	100.183	198.9	295.6	389.1	478.3	562.3	640.1	710.9	12° 0
10	188	98.9	95.5	88.8	77.7	61.3	38.5	08.5	10
20	193	98.8	95.4	88.5	77.1	60.2	36.9	06.1	20
30	199	98.8	95.3	88.2	76.5	59.2	35.2	03.7	30
40	204	98.8	95.1	87.9	75.9	58.1	33.5	01.2	40
50	209	98.7	95.0	87.6	75.3	57.0	31.8	698.6	50
13° 0	100.215	198.7	294.9	387.2	474.6	555.9	630.1	696.1	13° 0
10	220	98.7	94.7	86.9	74.0	54.8	28.3	93.5	10
20	226	98.6	94.6	86.6	73.3	53.7	26.5	90.9	20
30	232	98.6	94.5	86.3	72.7	52.5	24.8	88.3	30
40	237	98.6	94.3	85.9	72.0	51.4	22.9	85.7	40
50	243	98.5	94.2	85.6	71.3	50.2	21.1	83.0	50
14° 0	100.249	198.5	294.1	385.2	470.6	549.1	619.3	680.3	14° 0
10	255	98.5	93.9	84.9	70.0	47.9	17.4	77.5	10
20	261	98.4	93.8	84.5	69.3	46.7	15.5	74.8	20
30	267	98.4	93.6	84.2	68.6	45.5	13.6	72.0	30
40	274	98.4	93.5	83.8	67.8	44.2	11.7	69.2	40
50	280	98.3	93.3	83.4	67.1	43.0	09.8	66.3	50
15° 0	100.286	198.3	293.2	383.1	466.4	541.7	607.8	663.5	15° 0
10	293	98.3	93.0	82.7	65.7	40.5	05.8	60.6	10
20	299	98.2	92.9	82.3	64.9	39.2	03.8	57.7	20
30	306	98.2	92.7	81.9	64.2	37.9	01.8	54.8	30
40	312	98.1	92.6	81.5	63.4	36.6	599.8	51.8	40
50	319	98.1	92.4	81.2	62.6	35.3	97.8	48.8	50
16° 0	100.326	198.1	292.3	380.8	461.9	534.0	595.7	645.8	16° 0
10	332	98.0	92.1	80.4	61.1	32.6	93.6	42.8	10
20	339	98.0	91.9	80.0	60.3	31.3	91.5	39.7	20
30	346	97.9	91.8	79.6	59.5	29.9	89.4	36.6	30
40	353	97.9	91.6	79.1	58.7	28.6	87.3	33.6	40
50	361	97.8	91.4	78.7	57.9	27.2	85.1	30.4	50
17° 0	100.368	197.8	291.3	378.3	457.1	525.8	582.9	627.3	17° 0
10	375	97.8	91.1	77.9	56.2	24.4	80.7	24.1	10
20	382	97.7	90.9	77.5	55.4	22.9	78.5	20.9	20
30	390	97.7	90.7	77.0	54.6	21.5	76.3	17.7	30
40	397	97.6	90.6	76.6	53.7	20.1	74.1	14.5	40
50	405	97.6	90.4	76.2	52.9	18.6	71.8	11.2	50
18° 0	100.412	197.5	290.2	375.7	452.0	517.2	569.6	608.0	18° 0
10	420	97.5	90.0	75.3	51.1	15.7	67.3	04.7	10
20	428	97.4	89.8	74.8	50.4	14.2	65.0	01.3	20
30	436	97.4	89.7	74.4	49.4	12.7	62.7	598.0	30
40	444	97.4	89.5	73.9	48.5	11.2	60.3	94.7	40
50	452	97.3	89.3	73.5	47.6	09.7	58.0	91.3	50
19° 0	100.460	197.3	289.1	373.0	446.7	508.1	555.6	587.9	19° 0
10	468	97.2	88.9	72.6	45.8	06.6	53.3	84.5	10
20	476	97.2	88.7	72.1	44.9	05.0	50.9	81.0	20
30	484	97.1	88.5	71.6	44.0	03.5	48.5	77.6	30
40	493	97.1	88.3	71.1	43.0	01.9	46.0	74.1	40
50	501	97.0	88.1	70.7	42.1	00.3	43.6	70.6	50
20° 0	100.510	197.0	287.9	370.2	441.1	498.7	541.1	567.1	20° 0
Degree	Actual Arc.	2 Sta.	3 Sta.	4 Sta.	5 Sta.	6 Sta.	7 Sta.	8 Sta.	Degree

TABLE IX.—ACRES FOR STRIP 100 FEET WIDE.

Acres	L'gth. Feet.	Acres	L'gth. Feet.	Acres	L'gth. Feet.	Acres	L'gth. Feet.	Acres	L'gth. Feet.
0.00	2.18	0.60	263.54	1.20	524.90	1.80	786.26	2.40	1047.62
.01	6.53	.61	267.89	.21	529.25	.81	790.61	.41	1051.97
.02	10.89	.62	272.25	.22	533.61	.82	794.97	.42	1056.33
.03	15.25	.63	276.61	.23	537.97	.83	799.33	.43	1060.69
.04	19.60	.64	280.96	.24	542.32	.84	803.68	.44	1065.04
0.05	23.96	0.65	285.32	1.25	546.68	1.85	808.04	2.45	1069.40
.06	28.31	.66	289.67	.26	551.03	.86	812.39	.46	1073.75
.07	32.67	.67	294.03	.27	555.39	.87	816.75	.47	1078.11
.08	37.03	.68	298.39	.28	559.75	.88	821.11	.48	1082.47
.09	41.38	.69	302.74	.29	564.10	.89	825.46	.49	1086.82
0.10	45.74	0.70	307.10	1.30	568.46	1.90	829.82	2.50	1091.18
.11	50.09	.71	311.45	.31	572.81	.91	834.17	.51	1095.53
.12	54.45	.72	315.81	.32	577.17	.92	838.53	.52	1099.89
.13	58.81	.73	320.17	.33	581.53	.93	842.89	.53	1104.25
.14	63.16	.74	324.52	.34	585.88	.94	847.24	.54	1108.60
0.15	67.52	0.75	328.88	1.35	590.24	1.95	851.60	2.55	1112.96
.16	71.87	.76	333.23	.36	594.59	.96	855.95	.56	1117.31
.17	76.23	.77	337.59	.37	598.95	.97	860.31	.57	1121.67
.18	80.59	.78	341.95	.38	603.31	.98	864.67	.58	1126.03
.19	84.94	.79	346.30	.39	607.66	.99	869.02	.59	1130.38
0.20	89.30	0.80	350.66	1.40	612.02	2.00	873.38	2.60	1134.74
.21	93.65	.81	355.01	.41	616.37	.01	877.73	.61	1139.09
.22	98.01	.82	359.37	.42	620.73	.02	882.09	.62	1143.45
.23	102.37	.83	363.73	.43	625.09	.03	886.45	.63	1147.81
.24	106.72	.84	368.08	.44	629.44	.04	890.80	.64	1152.16
0.25	111.08	0.85	372.44	1.45	633.80	2.05	895.16	2.65	1156.52
.26	115.43	.86	376.79	.46	638.15	.06	899.51	.66	1160.87
.27	119.79	.87	381.15	.47	642.51	.07	903.87	.67	1165.23
.28	124.15	.88	385.51	.48	646.87	.08	908.23	.68	1169.59
.29	128.50	.89	389.86	.49	651.22	.09	912.58	.69	1173.94
0.30	132.86	0.90	394.22	1.50	655.58	2.10	916.94	2.70	1178.30
.31	137.21	.91	398.57	.51	659.93	.11	921.29	.71	1182.65
.32	141.57	.92	402.93	.52	664.29	.12	925.65	.72	1187.01
.33	145.93	.93	407.29	.53	668.65	.13	930.01	.73	1191.37
.34	150.28	.94	411.64	.54	673.00	.14	934.36	.74	1195.72
0.35	154.64	0.95	416.00	1.55	677.36	2.15	938.72	2.75	1200.08
.36	158.99	.96	420.35	.56	681.71	.16	943.07	.76	1204.43
.37	163.35	.97	424.71	.57	686.07	.17	947.43	.77	1208.79
.38	167.71	.98	429.07	.58	690.43	.18	951.79	.78	1213.15
.39	172.06	.99	433.42	.59	694.78	.19	956.14	.79	1217.50
0.40	176.42	1.00	437.78	1.60	699.14	2.20	960.50	2.80	1221.86
.41	180.77	.01	442.13	.61	703.49	.21	964.85	.81	1226.21
.42	185.13	.02	446.49	.62	707.85	.22	969.21	.82	1230.57
.43	189.49	.03	450.85	.63	712.21	.23	973.57	.83	1234.93
.44	193.84	.04	455.10	.64	716.56	.24	977.92	.84	1239.28
0.45	198.20	1.05	459.56	1.65	720.92	2.25	982.28	2.85	1243.64
.46	202.55	.06	463.91	.66	725.27	.26	986.63	.86	1247.99
.47	206.91	.07	468.27	.67	729.63	.27	990.99	.87	1252.35
.48	211.27	.08	472.63	.68	733.99	.28	995.35	.88	1256.71
.49	215.62	.09	476.98	.69	738.34	.29	999.70	.89	1261.06
0.50	219.98	1.10	481.34	1.70	742.70	2.30	1004.06	2.90	1265.42
.51	224.33	.11	485.69	.71	747.05	.31	1008.41	.91	1269.77
.52	228.69	.12	490.05	.72	751.41	.32	1012.77	.92	1274.13
.53	233.05	.13	494.41	.73	755.77	.33	1017.13	.93	1278.49
.54	237.40	.14	498.76	.74	760.12	.34	1021.48	.94	1282.84
0.55	241.76	1.15	503.12	1.75	764.48	2.35	1025.84	2.95	1287.20
.56	246.11	.16	507.47	.76	768.83	.36	1030.19	.96	1291.55
.57	250.47	.17	511.83	.77	773.19	.37	1034.55	.97	1295.91
.58	254.83	.18	516.19	.78	777.55	.38	1038.91	.98	1300.27
.59	259.18	.19	520.54	.79	781.90	.39	1043.26	.99	1304.62
.60	263.54	1.20	524.90	1.80	786.26	2.40	1047.62	3.00	1308.98

TABLE X.—CURVES FOR METRIC SYSTEM

Defl. Angle 20 m. Chord	Radius Meters	Log. Radius.	Tang. Off.	Mid. Ord.	Length Arc 20 m. Chord	Equiv. U. S. Curve	Defl. Angle 20 m. Chord
0° 10′	3437.75	3.536274	.058	.015	20.000	0°30′	0° 10′
20	1718.88	3.235246	.116	.019	20.000	1 01	20
30	1145.93	3.059158	.175	.044	20.000	1 31	30
40	859.46	2.934224	.233	.058	20.000	2 02	40
50	687.57	2.837319	.291	.073	20.001	2 32	50
1°	572.99	2.758145	.349	.087	20.001	3 03	1°
10	491.14	2.691206	.407	.102	20.001	3 33	10
20	429.76	2.633223	.465	.116	20.002	4 04	20
30	382.02	2.582081	.524	.131	20.002	4 35	30
40	343.82	2.536335	.582	.145	20.003	5 05	40
50	312.58	2.494955	.640	.160	20.003	5 36	50
2°	286.54	2.457181	.698	.175	20.004	6 06	2°
10	264.51	2.422434	.756	.189	20.005	6 36	10
20	245.62	2.390266	.814	.204	20.006	7 07	20
30	229.26	2.360320	.872	.218	20.006	7 37	30
40	214.94	2.332311	.931	.233	20.007	8 08	40
50	202.30	2.306002	.989	.247	20.008	8 39	50
3°	191.07	2.281200	1.047	.262	20.009	9 09	3°
10	181.03	2.257741	1.105	.276	20.010	9 40	10
20	171.98	2.235489	1.163	.291	20.011	10 10	20
30	163.80	2.214325	1.221	.316	20.012	10 41	30
40	156.37	2.194148	1.279	.320	20.014	11 11	40
50	149.58	2.174870	1.337	.335	20.015	11 42	50
4°	143.36	2.156415	1.395	.349	20.016	12 13	4°
10	137.63	2.138717	1.453	.364	20.018	12 43	10
20	132.35	2.121715	1.511	.378	20.019	13 14	20
30	127.45	2.105357	1.569	.393	20.021	13 44	30
40	122.91	2.089596	1.627	.407	20.022	14 15	40
50	118.68	2.074391	1.685	.422	20.024	14 46	50
5°	114.74	2.059704	1.743	.437	20.025	15 16	5°
10	111.05	2.045501	1.801	.451	20.027	15 47	10
20	107.58	2.031751	1.859	.466	20.029	16 18	20
30	104.33	2.018427	1.917	.480	20.031	16 48	30
40	101.28	2.005503	1.975	.495	20.033	17 19	40
50	98.39	1.992956	2.033	.509	20.035	17 50	50
6°	95.67	1.980765	2.091	.524	20.037	18 20	6°
10	93.09	1.968911	2.148	.539	20.039	18 51	10
20	90.65	1.957375	2.206	.553	20.041	19 22	20
30	88.34	1.946141	2.264	.568	20.043	19 52	30
40	86.14	1.935194	2.322	.582	20.045	20 23	40
50	84.05	1.924520	2.380	.597	20.047	20 54	50
7°	82.06	1.914106	2.437	.612	20.050	21 25	7°
10	80.16	1.903938	2.495	.626	20.052	21 56	10
20	78.34	1.894008	2.553	.641	20.055	22 27	20
30	76.61	1.884302	2.602	.655	20.057	22 57	30
40	74.96	1.874813	2.668	.670	20.060	23 28	40
50	73.37	1.865530	2.726	.685	20.062	23 59	50
8°	71.85	1.856445	2.783	.699	20.065	24 30	8°
10	70.40	1.847549	2.841	.714	20.068	25 01	10
20	69.00	1.838836	2.899	.729	20.071	25 32	20
30	67.65	1.830298	2.956	.743	20.074	26 03	30
40	66.36	1.821928	3.014	.758	20.076	26 33	40
50	65.12	1.813720	3.071	.772	20.079	27 05	50
9°	63.92	1.805668	3.129	.787	20.082	27 36	9°
10	62.77	1.797766	3.186	.802	20.086	28 07	10
20	61.66	1.790008	3.244	.816	20.089	28 38	20
30	60.58	1.782391	3.301	.831	20.092	29 09	30
40	59.55	1.774908	3.358	.846	20.095	29 40	40
50	58.55	1.767556	3.416	.860	20.099	30 11	50
10°	57.59	1.760330	3.473	.875	20.102	30 42	10°

TABLE IX.—ACRES FOR STRIP 100 FEET WIDE.

Acres	L'gth. Feet.	Acres	L'gth. Feet.	Acres	L'gth. Feet.	Acres	L'gth. Feet.	Acres	L'gth. Feet.
0.00	2.18	0.60	263.54	1.20	524.90	1.80	786.26	2.40	1047.62
.01	6.53	.61	267.89	.21	529.25	.81	790.61	.41	1051.97
.02	10.89	.62	272.25	.22	533.61	.82	794.97	.42	1056.33
.03	15.25	.63	276.61	.23	537.97	.83	799.33	.43	1060.69
.04	19.60	.64	280.96	.24	542.32	.84	803.68	.44	1065.04
0.05	23.96	0.65	285.32	1.25	546.68	1.85	808.04	2.45	1069.40
.06	28.31	.66	289.67	.26	551.03	.86	812.39	.46	1073.75
.07	32.67	.67	294.03	.27	555.39	.87	816.75	.47	1078.11
.08	37.03	.68	298.39	.28	559.75	.88	821.11	.48	1082.47
.09	41.38	.69	302.74	.29	564.10	.89	825.46	.49	1086.82
0.10	45.74	0.70	307.10	1.30	568.46	1.90	829.82	2.50	1091.18
.11	50.09	.71	311.45	.31	572.81	.91	834.17	.51	1095.53
.12	54.45	.72	315.81	.32	577.17	.92	838.53	.52	1099.89
.13	58.81	.73	320.17	.33	581.53	.93	842.89	.53	1104.25
.14	63.16	.74	324.52	.34	585.88	.94	847.24	.54	1108.60
0.15	67.52	0.75	328.88	1.35	590.24	1.95	851.60	2.55	1112.96
.16	71.87	.76	333.23	.36	594.59	.96	855.95	.56	1117.31
.17	76.23	.77	337.59	.37	598.95	.97	860.31	.57	1121.67
.18	80.59	.78	341.95	.38	603.31	.98	864.67	.58	1126.03
.19	84.94	.79	346.30	.39	607.66	.99	869.02	.59	1130.38
0.20	89.30	0.80	350.66	1.40	612.02	2.00	873.38	2.60	1134.74
.21	93.65	.81	355.01	.41	616.37	.01	877.73	.61	1139.09
.22	98.01	.82	359.37	.42	620.73	.02	882.09	.62	1143.45
.23	102.37	.83	363.73	.43	625.09	.03	886.45	.63	1147.81
.24	106.72	.84	368.08	.44	629.44	.04	890.80	.64	1152.16
0.25	111.08	0.85	372.44	1.45	633.80	2.05	895.16	2.65	1156.52
.26	115.43	.86	376.79	.46	638.15	.06	899.51	.66	1160.87
.27	119.79	.87	381.15	.47	642.51	.07	903.87	.67	1165.23
.28	124.15	.88	385.51	.48	646.87	.08	908.23	.68	1169.59
.29	128.50	.89	389.86	.49	651.22	.09	912.58	.69	1173.94
0.30	132.86	0.90	394.22	1.50	655.58	2.10	916.94	2.70	1178.30
.31	137.21	.91	398.57	.51	659.93	.11	921.29	.71	1182.65
.32	141.57	.92	402.93	.52	664.29	.12	925.65	.72	1187.01
.33	145.93	.93	407.29	.53	668.65	.13	930.01	.73	1191.37
.34	150.28	.94	411.64	.54	673.00	.14	934.36	.74	1195.72
0.35	154.64	0.95	416.00	1.55	677.36	2.15	938.72	2.75	1200.08
.36	158.99	.96	420.35	.56	681.71	.16	943.07	.76	1204.43
.37	163.35	.97	424.71	.57	686.07	.17	947.43	.77	1208.79
.38	167.71	.98	429.07	.58	690.43	.18	951.79	.78	1213.15
.39	172.06	.99	433.42	.59	694.78	.19	956.14	.79	1217.50
0.40	176.42	1.00	437.78	1.60	699.14	2.20	960.50	2.80	1221.86
.41	180.77	.01	442.13	.61	703.49	.21	964.85	.81	1226.21
.42	185.13	.02	446.49	.62	707.85	.22	969.21	.82	1230.57
.43	189.49	.03	450.85	.63	712.21	.23	973.57	.83	1234.93
.44	193.84	.04	455.10	.64	716.56	.24	977.92	.84	1239.28
0.45	198.20	1.05	459.56	1.65	720.92	2.25	982.28	2.85	1243.64
.46	202.55	.06	463.91	.66	725.27	.26	986.63	.86	1247.99
.47	206.91	.07	468.27	.67	729.63	.27	990.99	.87	1252.35
.48	211.27	.08	472.63	.68	733.99	.28	995.35	.88	1256.71
.49	215.62	.09	476.98	.69	738.34	.29	999.70	.89	1261.06
0.50	219.98	1.10	481.34	1.70	742.70	2.30	1004.06	2.90	1265.42
.51	224.33	.11	485.69	.71	747.05	.31	1008.41	.91	1269.77
.52	228.69	.12	490.05	.72	751.41	.32	1012.77	.92	1274.13
.53	233.05	.13	494.41	.73	755.77	.33	1017.13	.93	1278.49
.54	237.40	.14	498.76	.74	760.12	.34	1021.48	.94	1282.84
0.55	241.76	1.15	503.12	1.75	764.48	2.35	1025.84	2.95	1287.20
.56	246.11	.16	507.47	.76	768.83	.36	1030.19	.96	1291.55
.57	250.47	.17	511.83	.77	773.19	.37	1034.55	.97	1295.91
.58	254.83	.18	516.19	.78	777.55	.38	1038.91	.98	1300.27
.59	259.18	.19	520.54	.79	781.90	.39	1043.26	.99	1304.62
0.60	263.54	1.20	524.90	1.80	786.26	2.40	1047.62	3.00	1308.98

TABLE X.—CURVES FOR METRIC SYSTEM

Defl. Angle 20 m. Chord	Radius Meters	Log. Radius.	Tang. Off.	Mid. Ord.	Length Arc 20 m. Chord	Equiv. U. S. Curve	Defl. Angle 20 m. Chord
0° 10′	3437.75	3.536274	.058	.015	20.000	0°30′	0° 10′
20	1718.88	3.235246	.116	.019	20.000	1 01	20
30	1145.93	3.059158	.175	.044	20.000	1 31	30
40	859.46	2.934224	.233	.058	20.000	2 02	40
50	687.57	2.837319	.291	.073	20.001	2 32	50
1°	572.99	2.758145	.349	.087	20.001	3 03	1°
10	491.14	2.691206	.407	.102	20.001	3 33	10
20	429.76	2.633223	.465	.116	20.002	4 04	20
30	382.02	2.582081	.524	.131	20.002	4 35	30
40	343.82	2.536335	.582	.145	20.003	5 05	40
50	312.58	2.494955	.640	.160	20.003	5 36	50
2°	286.54	2.457181	.698	.175	20.004	6 06	2°
10	264.51	2.422434	.756	.189	20.005	6 36	10
20	245.62	2.390266	.814	.204	20.006	7 07	20
30	229.26	2.360320	.872	.218	20.006	7 37	30
40	214.94	2.332311	.931	.233	20.007	8 08	40
50	202.30	2.306002	.989	.247	20.008	8 39	50
3°	191.07	2.281200	1.047	.262	20.009	9 09	3°
10	181.03	2.257741	1.105	.276	20.010	9 40	10
20	171.98	2.235489	1.163	.291	20.011	10 10	20
30	163.80	2.214325	1.221	.316	20.012	10 41	30
40	156.37	2.194148	1.279	.320	20.014	11 11	40
50	149.58	2.174870	1.337	.335	20.015	11 42	50
4°	143.36	2.156415	1.395	.349	20.016	12 13	4°
10	137.63	2.138717	1.453	.364	20.018	12 43	10
20	132.35	2.121715	1.511	.378	20.019	13 14	20
30	127.45	2.105357	1.569	.393	20.021	13 44	30
40	122.91	2.089596	1.627	.407	20.022	14 15	40
50	118.68	2.074391	1.685	.422	20.024	14 46	50
5°	114.74	2.059704	1.743	.437	20.025	15 16	5°
10	111.05	2.045501	1.801	.451	20.027	15 47	10
20	107.58	2.031751	1.859	.466	20.029	16 18	20
30	104.33	2.018427	1.917	.480	20.031	16 48	30
40	101.28	2.005503	1.975	.495	20.033	17 19	40
50	98.39	1.992956	2.033	.509	20.035	17 50	50
6°	95.67	1.980765	2.091	.524	20.037	18 20	6°
10	93.09	1.968911	2.148	.539	20.039	18 51	10
20	90.65	1.957375	2.206	.553	20.041	19 22	20
30	88.34	1.946141	2.264	.568	20.043	19 52	30
40	86.14	1.935194	2.322	.582	20.045	20 23	40
50	84.05	1.924520	2.380	.597	20.047	20 54	50
7°	82.06	1.914106	2.437	.612	20.050	21 25	7°
10	80.16	1.903938	2.495	.626	20.052	21 56	10
20	78.34	1.894008	2.553	.641	20.055	22 27	20
30	76.61	1.884302	2.602	.655	20.057	22 57	30
40	74.96	1.874813	2.668	.670	20.060	23 28	40
50	73.37	1.865530	2.726	.685	20.062	23 59	50
8°	71.85	1.856445	2.783	.699	20.065	24 30	8°
10	70.40	1.847549	2.841	.714	20.068	25 01	10
20	69.00	1.838836	2.899	.729	20.071	25 32	20
30	67.65	1.830298	2.956	.743	20.074	26 03	30
40	66.36	1.821928	3.014	.758	20.076	26 33	40
50	65.12	1.813720	3.071	.772	20.079	27 05	50
9°	63.92	1.805668	3.129	.787	20.082	27 36	9°
10	62.77	1.797766	3.186	.802	20.086	28 07	10
20	61.66	1.790008	3.244	.816	20.089	28 38	20
30	60.58	1.782391	3.301	.831	20.092	29 09	30
40	59.55	1.774908	3.358	.846	20.095	29 40	40
50	58.55	1.767556	3.416	.860	20.099	30 11	50
10°	57.59	1.760330	3.473	.875	20.102	30 42	10°

TABLE XI.—BAROMETRIC HEIGHTS.

Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.
31.00	0	30.40	533	29.80	1076	29.20	1630	28.60	2196
30.99	9	39	542	79	1085	19	1639	59	2205
98	18	38	551	78	1094	18	1649	58	2215
97	27	37	559	77	1103	17	1658	57	2224
96	35	36	569	76	1113	16	1668	56	2234
30.95	44	30.35	578	29.75	1122	29.15	1677	28.55	2243
94	53	34	587	74	1132	14	1687	54	2253
93	62	33	596	73	1141	13	1696	53	2263
92	71	32	605	72	1150	12	1706	52	2272
91	80	31	613	71	1159	11	1715	51	2282
30.90	88	30.30	622	29.70	1169	29.10	1725	28.50	2291
89	97	29	631	69	1177	09	1734	49	2301
88	106	28	640	68	1186	08	1743	48	2310
87	115	27	649	67	1195	07	1752	47	2320
86	124	26	658	66	1205	06	1762	46	2329
30.85	133	30.25	667	29.65	1214	29.05	1771	28.45	2339
84	142	24	676	64	1224	04	1781	44	2349
83	151	23	685	63	1233	03	1790	43	2358
82	160	22	694	62	1242	02	1799	42	2368
81	168	21	703	61	1251	01	1809	41	2378
30.80	177	30.20	712	29.60	1260	29.00	1818	28.40	2387
79	186	19	721	59	1269	28.99	1827	39	2397
78	195	18	730	58	1278	98	1837	38	2407
77	203	17	740	57	1287	97	1846	37	2416
76	212	16	749	56	1296	96	1856	36	2426
30.75	221	30.15	758	29.55	1305	28.95	1865	28.35	2435
74	230	14	767	54	1314	94	1875	34	2445
73	239	13	776	53	1324	93	1884	33	2455
72	247	12	785	52	1333	92	1894	32	2464
71	256	11	794	51	1342	91	1903	31	2474
30.70	265	30.10	803	29.50	1352	28.90	1913	28.30	2483
69	274	09	812	49	1361	89	1922	29	2493
68	283	08	821	48	1370	88	1931	28	2503
67	292	07	830	47	1379	87	1941	27	2512
66	301	06	839	46	1389	86	1950	26	2522
30.65	310	30.05	849	29.45	1398	28.85	1960	28.25	2531
64	318	04	857	44	1408	84	1969	24	2541
63	327	03	866	43	1417	83	1979	23	2551
62	336	02	875	42	1426	82	1988	22	2561
61	345	01	884	41	1435	81	1998	21	2570
30.60	354	30.00	893	29.40	1445	28.80	2007	28.20	2580
59	363	29.99	903	39	1454	79	2016	19	2590
58	372	98	911	38	1464	78	2026	18	2600
57	381	97	920	37	1473	77	2035	17	2609
56	390	96	929	36	1482	76	2044	16	2619
30.55	399	29.95	938	29.35	1491	28.75	2054	28.15	2628
54	407	94	947	34	1500	74	2063	14	2638
53	416	93	956	33	1509	73	2073	13	2648
52	425	92	965	32	1519	72	2082	12	2658
51	434	91	976	31	1528	71	2091	11	2667
30.50	443	29.90	985	29.30	1537	28.70	2101	28.10	2677
49	452	89	994	29	1546	69	2111	09	2687
48	461	88	1002	28	1556	68	2120	08	2696
47	470	87	1012	27	1565	67	2129	07	2706
46	479	86	1021	26	1574	66	2139	06	2715
30.45	488	29.85	1030	29.25	1583	28.65	2148	28.05	2726
44	497	84	1039	24	1593	64	2158	04	2735
43	506	83	1049	23	1603	63	2168	03	2745
42	515	82	1058	22	1612	62	2177	02	2755
41	524	81	1067	21	1621	61	2186	01	2765
30.40	533	29.80	1076	29.20	1630	28.60	2196	28.00	2774

TABLE XI.—BAROMETRIC HEIGHTS.

Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.
28.00	2774	27.40	3365	26.80	3968	26.20	4585	25.60	5216
27.99	2784	.39	3375	79	3978	19	4596	59	5227
98	2794	38	3384	78	3988	18	4606	58	5237
97	2804	37	3394	77	3999	17	4617	57	5248
96	2813	36	3404	76	4009	16	4627	56	5259
27.95	2823	27.35	3414	26.75	4019	26.15	4638	25.55	5270
94	2833	34	3424	74	4030	14	4648	54	5281
93	2843	33	3434	73	4040	13	4658	53	5291
92	2853	32	3444	72	4050	12	4669	52	5302
91	2863	31	3454	71	4060	11	4679	51	5312
27.90	2873	27.30	3464	26.70	4070	26.10	4690	25.50	5323
89	2882	29	3474	69	4081	09	4700	49	5333
88	2892	28	3484	68	4091	08	4711	48	5344
87	2901	27	3494	67	4101	07	4721	47	5355
86	2911	26	3504	66	4111	06	4731	46	5365
27.85	2921	27.25	3514	26.65	4122	26.05	4742	25.45	5376
84	2930	24	3524	64	4132	04	4752	44	5387
83	2940	23	3534	63	4142	03	4763	43	5397
82	2950	22	3544	62	4152	02	4773	42	5408
81	2960	21	3554	61	4163	01	4784	41	5419
27.80	2969	27.20	3564	26.60	4173	26.00	4794	25.40	5429
79	2979	19	3574	59	4183	25.99	4805	39	5440
78	2989	18	3584	58	4193	98	4815	38	5451
77	2999	17	3594	57	4203	97	4826	37	5462
76	3009	16	3604	56	4213	96	4836	36	5473
27.75	3019	27.15	3614	26.55	4223	25.95	4847	25.35	5483
74	3029	14	3624	54	4233	94	4857	34	5494
73	3039	13	3634	53	4244	93	4868	33	5505
72	3048	12	3644	52	4254	92	4878	32	5516
71	3058	11	3654	51	4264	91	4889	31	5527
27.70	3068	27.10	3665	26.50	4274	25.90	4899	25.30	5537
69	3078	09	3675	49	4284	89	4910	29	5548
68	3087	08	3685	48	4294	88	4920	28	5559
67	3097	07	3695	47	4304	87	4931	27	5570
66	3107	06	3705	46	4315	86	4941	26	5581
27.65	3117	27.05	3715	26.45	4326	25.85	4952	25.25	5592
64	3126	04	3725	44	4336	84	4962	24	5602
63	3136	03	3735	43	4347	83	4973	23	5613
62	3146	02	3745	42	4357	82	4983	22	5624
61	3156	01	3755	41	4368	81	4994	21	5635
27.60	3166	27.00	3765	26.40	4378	25.80	5004	25.20	5646
59	3176	26.99	3775	39	4388	79	5014	19	5657
58	3186	98	3785	38	4399	78	5025	18	5668
57	3196	97	3795	37	4409	77	5036	17	5679
56	3206	96	3806	36	4419	76	5046	16	5689
27.55	3216	26.95	3816	26.35	4430	25.75	5057	25.15	5700
54	3225	94	3826	34	4440	74	5067	14	5711
53	3235	93	3836	33	4450	73	5078	13	5722
52	3245	92	3846	32	4461	72	5088	12	5733
51	3255	91	3856	31	4472	71	5099	11	5744
27.50	3265	26.90	3866	26.30	4482	25.70	5110	25.10	5754
49	3275	89	3876	29	4492	69	5121	09	5765
48	3285	88	3886	28	4502	68	5132	08	5776
47	3295	87	3897	27	4513	67	5142	07	5787
46	3305	86	3907	26	4523	66	5153	06	5798
27.45	3315	26.85	3917	26.25	4533	25.65	5164	25.05	5809
44	3325	84	3927	24	4544	64	5174	04	5820
43	3335	83	3938	23	4554	63	5185	03	5831
42	3345	82	3948	22	4565	62	5195	02	5842
41	3355	81	3958	21	4575	61	5206	01	5853
27.40	3365	26.80	3968	26.20	4585	25.60	5216	25.00	5863

TABLE XI.—BAROMETRIC HEIGHTS.

Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet
25.00	5863	24.40	6525	23.80	7203	23.20	7900	22.60	8615
24.99	5874	39	6536	79	7214	19	7912	59	8627
98	5885	38	6547	78	7226	18	7923	58	8638
97	5896	37	6559	77	7237	17	7935	57	8650
96	5907	36	6570	76	7249	16	7946	56	8661
24.95	5918	24.35	6581	23.75	7261	23.15	7958	22.55	8673
94	5929	34	6592	74	7272	14	7969	54	8685
93	5940	33	6603	73	7283	13	7981	53	8697
92	5950	32	6615	72	7294	12	7992	52	8709
91	5962	31	6626	71	7305	11	8004	51	8721
24.90	5972	24.30	6637	23.70	7316	23.10	8015	22.50	8733
89	5983	29	6648	69	7327	09	8027	49	8745
88	5994	28	6659	68	7339	08	8039	48	8757
87	6005	27	6671	67	7350	07	8051	47	8769
86	6016	26	6682	66	7362	06	8063	46	8781
24.85	6027	24.25	6693	23.65	7374	23.05	8075	22.45	8793
84	6038	24	6705	64	7386	04	8086	44	8806
83	6049	23	6716	63	7398	03	8098	43	8818
82	6060	22	6727	62	7409	02	8110	42	8830
81	6071	21	6738	61	7421	01	8122	41	8842
24.80	6082	24.20	6750	23.60	7433	23.00	8134	22.40	8855
79	6093	19	6761	59	7445	22.99	8146	39	8867
78	6104	18	6772	58	7456	98	8158	38	8879
77	6115	17	6783	57	7468	97	8170	37	8891
76	6126	16	6795	56	7480	96	8182	36	8904
24.75	6137	24.15	6806	23.55	7492	22.95	8194	22.35	8916
74	6148	14	6817	54	7503	94	8206	34	8928
73	6159	13	6828	53	7515	93	8218	33	8941
72	6170	12	6840	52	7527	92	8230	32	8953
71	6181	11	6851	51	7539	91	8242	31	8965
24.70	6192	24.10	6862	23.50	7550	22.90	8254	22.30	8977
69	6203	09	6873	49	7562	89	8266	29	8990
68	6214	08	6885	48	7574	88	8278	28	9002
67	6225	07	6896	47	7585	87	8290	27	9014
66	6236	06	6907	46	7597	86	8302	26	9026
24.65	6247	24.05	6919	23.45	7609	22.85	8314	22.25	9039
64	6258	04	6930	44	7621	84	8326	24	9051
63	6269	03	6941	43	7633	83	8338	23	9063
62	6280	02	6953	42	7644	82	8350	22	9075
61	6291	01	6964	41	7656	81	8362	21	9088
24.60	6302	24.00	6976	23.40	7667	22.80	8374	22.20	9100
59	6313	23.99	6987	39	7679	79	8386	19	9113
58	6324	98	6999	38	7690	78	8398	18	9125
57	6335	97	7010	37	7702	77	8410	17	9138
56	6346	96	7022	36	7713	76	8422	16	9150
24.55	6357	23.95	7033	23.35	7725	22.75	8434	22.15	9162
54	6368	94	7045	34	7736	74	8446	14	9174
53	6379	93	7056	33	7748	73	8458	13	9187
52	6390	92	7068	32	7759	72	8470	12	9199
51	6401	91	7079	31	7771	71	8482	11	9212
24.50	6412	23.90	7090	23.30	7782	22.70	8495	22.10	9224
49	6424	89	7101	29	7793	69	8507	09	9236
48	6435	88	7113	28	7805	68	8519	08	9249
47	6446	87	7124	27	7817	67	8531	07	9262
46	6458	86	7135	26	7829	66	8543	06	9274
24.45	6469	23.85	7146	23.25	7841	22.65	8555	22.05	9286
44	6480	84	7157	24	7853	64	8567	04	9298
43	6491	83	7168	23	7865	63	8579	03	9311
42	6503	82	7180	22	7876	62	8591	02	9323
41	6514	81	7191	21	7888	61	8603	01	9336
24.40	6525	23.80	7203	23.20	7900	22.60	8615	22.00	9348

TABLE XI.—BAROMETRIC HEIGHTS.

Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.
22.00	9348	21.40	10101	20.80	10876	20.20	11673
21.99	9360	39	10114	79	10889	19	11687
98	9372	38	10126	78	10902	18	11700
97	9384	37	10139	77	10915	17	11714
96	9397	36	10151	76	10928	16	11727
21.95	9410	21.35	10164	20.75	10941	20.15	11741
94	9422	34	10176	74	10954	14	11754
93	9435	33	10189	73	10967	13	11768
92	9447	32	10202	72	10980	12	11781
91	9460	31	10214	71	10993	11	11795
21.90	9472	21.30	10228	20.70	11006	20.10	11808
89	9485	29	10241	69	11019	09	11821
88	9497	28	10253	68	11032	08	11835
87	9510	27	10266	67	11045	07	11859
86	9522	26	10278	66	11058	06	11863
21.85	9535	21.25	10291	20.65	11071	20.05	11877
84	9547	24	10304	64	11084	04	11891
83	9560	23	10317	63	11097	03	11905
82	9572	22	10330	62	11110	02	11918
81	9585	21	10343	61	11123	01	11932
21.80	9597	21.20	10355	20.60	11136	20.00	11945
79	9610	19	10368	59	11149		
78	9622	18	10381	58	11163		
77	9635	17	10394	57	11176		
76	9647	16	10407	56	11190		
21.75	9660	21.15	10420	20.55	11204		
74	9672	14	10432	54	11217		
73	9685	13	10445	53	11230		
72	9697	12	10458	52	11243		
71	9710	11	10471	51	11257		
21.70	9722	21.10	10484	20.50	11270		
69	9735	09	10497	49	11284		
68	9747	08	10509	48	11297		
67	9760	07	10522	47	11311		
66	9772	06	10535	46	11324		
21.65	9785	21.05	10548	20.45	11338		
64	9797	04	10561	44	11351		
63	9810	03	10574	43	11364		
62	9822	02	10587	42	11377		
61	9835	01	10600	41	11391		
21.60	9848	21.00	10613	20.40	11404		
59	9861	20.99	10627	39	11418		
58	9873	98	10640	38	11431		
57	9886	97	10654	37	11444		
56	9898	96	10667	36	11457		
21.55	9911	20.95	10681	20.35	11470		
54	9923	94	10694	34	11483		
53	9936	93	10707	33	11496		
52	9949	92	10720	32	11509		
51	9962	91	10733	31	11523		
21.50	9974	20.90	10746	20.30	11536		
49	9987	89	10759	29	11550		
48	9999	88	10772	28	11563		
47	10012	87	10785	27	11577		
46	10025	86	10798	26	11591		
21.45	10038	20.85	10811	20.25	11605		
44	10050	84	10824	24	11618		
43	10063	83	10837	23	11632		
42	10075	82	10850	22	11645		
41	10088	81	10863	21	11659		
21.40	10101	20.80	10876	20.20	11673		

TABLE XI.—BAROMETRIC HEIGHTS.

Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet	Barometer Readings. Inches	Hgts. Feet.
25.00	5863	24.40	6525	23.80	7203	23.20	7900	22.60	8615
24.99	5874	39	6536	79	7214	19	7912	59	8627
98	5885	38	6547	78	7226	18	7923	58	8638
97	5896	37	6559	77	7237	17	7935	57	8650
96	5907	36	6570	76	7249	16	7946	56	8661
24.95	5918	24.35	6581	23.75	7261	23.15	7958	22.55	8673
94	5929	34	6592	74	7272	14	7969	54	8685
93	5940	33	6603	73	7283	13	7981	53	8697
92	5950	32	6615	72	7294	12	7992	52	8709
91	5962	31	6626	71	7305	11	8004	51	8721
24.90	5972	24.30	6637	23.70	7316	23.10	8015	22.50	8733
89	5983	29	6648	69	7327	09	8027	49	8745
88	5994	28	6659	68	7339	08	8039	48	8757
87	6005	27	6671	67	7350	07	8051	47	8769
86	6016	26	6682	66	7362	06	8063	46	8781
24.85	6027	24.25	6693	23.65	7374	23.05	8075	22.45	8793
84	6038	24	6705	64	7386	04	8086	44	8806
83	6049	23	6716	63	7398	03	8098	43	8818
82	6060	22	6727	62	7409	02	8110	42	8830
81	6071	21	6738	61	7421	01	8122	41	8842
24.80	6082	24.20	6750	23.60	7433	23.00	8134	22.40	8855
79	6093	19	6761	59	7445	22.99	8146	39	8867
78	6104	18	6772	58	7456	98	8158	38	8879
77	6115	17	6783	57	7468	97	8170	37	8891
76	6126	16	6795	56	7480	96	8182	36	8904
24.75	6137	24.15	6806	23.55	7492	22.95	8194	22.35	8916
74	6148	14	6817	54	7503	94	8206	34	8928
73	6159	13	6828	53	7515	93	8218	33	8941
72	6170	12	6840	52	7527	92	8230	32	8953
71	6181	11	6851	51	7539	91	8242	31	8965
24.70	6192	24.10	6862	23.50	7550	22.90	8254	22.30	8977
69	6203	09	6873	49	7562	89	8266	29	8990
68	6214	08	6885	48	7574	88	8278	28	9002
67	6225	07	6896	47	7585	87	8290	27	9014
66	6236	06	6907	46	7597	86	8302	26	9026
24.65	6247	24.05	6919	23.45	7609	22.85	8314	22.25	9039
64	6258	04	6930	44	7621	84	8326	24	9051
63	6269	03	6941	43	7633	83	8338	23	9063
62	6280	02	6953	42	7644	82	8350	22	9075
61	6291	01	6964	41	7656	81	8362	21	9088
24.60	6302	24.00	6976	23.40	7667	22.80	8374	22.20	9100
59	6313	23.99	6987	39	7679	79	8386	19	9113
58	6324	98	6999	38	7690	78	8398	18	9125
57	6335	97	7010	37	7702	77	8410	17	9138
56	6346	96	7022	36	7713	76	8422	16	9150
24.55	6357	23.95	7033	23.35	7725	22.75	8434	22.15	9162
54	6368	94	7045	34	7736	74	8446	14	9174
53	6379	93	7056	33	7748	73	8458	13	9187
52	6390	92	7068	32	7759	72	8470	12	9199
51	6401	91	7079	31	7771	71	8482	11	9212
24.50	6412	23.90	7090	23.30	7782	22.70	8495	22.10	9224
49	6424	89	7101	29	7793	69	8507	09	9236
48	6435	88	7113	28	7805	68	8519	08	9249
47	6446	87	7124	27	7817	67	8531	07	9262
46	6458	86	7135	26	7829	66	8543	06	9274
24.45	6469	23.85	7146	23.25	7841	22.65	8555	22.05	9286
44	6480	84	7157	24	7853	64	8567	04	9298
43	6491	83	7168	23	7865	63	8579	03	9311
42	6503	82	7180	22	7876	62	8591	02	9323
41	6514	81	7191	21	7888	61	8603	01	9336
24.40	6525	23.80	7203	23.20	7900	22.60	8615	22.00	9348

TABLE XI.—BAROMETRIC HEIGHTS.

Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.	Barometer Readings. Inches	Hgts. Feet.
22.00	9348	21.40	10101	20.80	10876	20.20	11673
21.99	9360	39	10114	79	10889	19	11687
98	9372	38	10126	78	10902	18	11700
97	9384	37	10139	77	10915	17	11714
96	9397	36	10151	76	10928	16	11727
21.95	9410	21.35	10164	20.75	10941	20.15	11741
94	9422	34	10176	74	10954	14	11754
93	9435	33	10189	73	10967	13	11768
92	9447	32	10202	72	10980	12	11781
91	9460	31	10214	71	10993	11	11795
21.90	9472	21.30	10228	20.70	11006	20.10	11808
89	9485	29	10241	69	11019	09	11821
88	9497	28	10253	68	11032	08	11835
87	9510	27	10266	67	11045	07	11859
86	9522	26	10278	66	11058	06	11863
21.85	9535	21.25	10291	20.65	11071	20.05	11877
84	9547	24	10304	64	11084	04	11891
83	9560	23	10317	63	11097	03	11905
82	9572	22	10330	62	11110	02	11918
81	9585	21	10343	61	11123	01	11932
21.80	9597	21.20	10355	20.60	11136	20.00	11945
79	9610	19	10368	59	11149		
78	9622	18	10381	58	11163		
77	9635	17	10394	57	11176		
76	9647	16	10407	56	11190		
21.75	9660	21.15	10420	20.55	11204		
74	9672	14	10432	54	11217		
73	9685	13	10445	53	11230		
72	9697	12	10458	52	11243		
71	9710	11	10471	51	11257		
21.70	9722	21.10	10484	20.50	11270		
69	9735	09	10497	49	11284		
68	9747	08	10509	48	11297		
67	9760	07	10522	47	11311		
66	9772	06	10535	46	11324		
21.65	9785	21.05	10548	20.45	11338		
64	9797	04	10561	44	11351		
63	9810	03	10574	43	11364		
62	9822	02	10587	42	11377		
61	9835	01	10600	41	11391		
21.60	9848	21.00	10613	20.40	11404		
59	9861	20.99	10627	39	11418		
58	9873	98	10640	38	11431		
57	9886	97	10654	37	11444		
56	9898	96	10667	36	11457		
21.55	9911	20.95	10681	20.35	11470		
54	9923	94	10694	34	11483		
53	9936	93	10707	33	11496		
52	9949	92	10720	32	11509		
51	9962	91	10733	31	11523		
21.50	9974	20.90	10746	20.30	11536		
49	9987	89	10759	29	11550		
48	9999	88	10772	28	11563		
47	10012	87	10785	27	11577		
46	10025	86	10798	26	11591		
21.45	10038	20.85	10811	20.25	11605		
44	10050	84	10824	24	11618		
43	10063	83	10837	23	11632		
42	10075	82	10850	22	11645		
41	10088	81	10863	21	11659		
21.40	10101	20.80	10876	20.20	11673		

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
100	000000	0434	0868	1301	1734	2166	2598	3029	3461	3891	432
101	4321	4751	5181	5609	6038	6466	6894	7321	7748	8174	428
102	8600	9026	9451	9876	*0300	*0724	*1147	*1570	*1993	*2415	424
103	012837	3259	3680	4100	4521	4940	5360	5779	6197	6616	420
104	7033	7451	7868	8284	8700	9116	9532	9947	*0361	*0775	416
105	021189	1603	2016	2428	2841	3252	3664	4075	4486	4896	412
106	5306	5715	6125	6533	6942	7350	7757	8164	8571	8978	408
107	9384	9789	*0195	*0600	*1004	*1408	*1812	*2216	*2619	*3021	404
108	033424	3826	4227	4628	5029	5430	5830	6230	6629	7028	400
109	7426	7825	8223	8620	9017	9414	9811	*0207	*0602	*0998	397

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	434	43	87	130	174	217	260	304	347	391	434
	433	43	87	130	173	217	260	303	346	390	433
	432	43	86	130	173	216	259	302	346	389	432
	431	43	86	129	172	216	259	302	345	388	431
	430	43	86	129	172	215	258	301	344	387	430
	429	43	86	129	172	215	257	300	343	386	429
	428	43	86	128	171	214	257	300	342	385	428
	427	43	85	128	171	214	256	299	342	384	427
	426	43	85	128	170	213	256	298	341	383	426
	425	43	85	128	170	213	255	298	340	383	425
	424	42	85	127	170	212	254	297	339	382	424
	423	42	85	127	169	212	254	296	338	381	423
	422	42	84	127	169	211	253	295	338	380	422
	421	42	84	126	168	211	253	295	337	379	421
	420	42	84	126	168	210	252	294	336	378	420
	419	42	84	126	168	210	251	293	335	377	419
	418	42	84	125	167	209	251	293	334	376	418
	417	42	83	125	167	209	250	292	334	375	417
	416	42	83	125	166	208	250	291	333	374	416
	415	42	83	125	166	208	249	291	332	374	415
	414	41	83	124	166	207	248	290	331	373	414
	413	41	83	124	165	207	248	289	330	372	413
	412	41	82	124	165	206	247	288	330	371	412
	411	41	82	123	164	206	247	288	329	370	411
	410	41	82	123	164	205	246	287	328	369	410
	409	41	82	123	164	205	245	286	327	368	409
	408	41	82	122	163	204	245	286	326	367	408
	407	41	81	122	163	204	244	285	326	366	407
	406	41	81	122	162	203	244	284	325	365	406
	405	41	81	122	162	203	243	284	324	365	405
	404	40	81	121	162	202	242	283	323	364	404
	403	40	81	121	161	202	242	282	322	363	403
	402	40	80	121	161	201	241	281	322	362	402
	401	40	80	120	160	201	241	281	321	361	401
	400	40	80	120	160	200	240	280	320	360	400
	399	40	80	120	160	200	239	279	319	359	399
	398	40	80	119	159	199	239	279	318	358	398
	397	40	79	119	159	199	238	278	318	357	397
	396	40	79	119	158	198	238	277	317	356	396
	395	40	79	119	158	198	237	277	316	356	395
	394	39	79	118	158	197	236	276	315	355	394
	393	39	79	118	157	197	236	275	314	354	393
	392	39	78	118	157	196	235	274	314	353	392
	391	39	78	117	156	196	235	274	313	352	391
	390	39	78	117	156	195	234	273	312	351	390
	389	39	78	117	156	195	233	272	311	350	389
	388	39	78	116	155	194	233	272	310	349	388
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
110	041393	1787	2182	2576	2969	3362	3755	4148	4540	4932	393
111	5323	5714	6105	6495	6885	7275	7664	8053	8442	8830	390
112	9218	9606	9993	*0380	*0766	*1153	*1538	*1924	*2309	*2694	386
113	053078	3463	3846	4230	4613	4996	5378	5760	6142	6524	383
114	6905	7286	7666	8046	8426	8805	9185	9563	9942	*0320	379
115	060698	1075	1452	1829	2206	2582	2958	3333	3709	4083	376
116	4458	4832	5206	5580	5953	6326	6699	7071	7443	7815	373
117	8186	8557	8928	9298	9668	*0038	*0407	*0776	*1145	*1514	370
118	071882	2250	2617	2985	3352	3718	4085	4451	4816	5182	366
119	5547	5912	6276	6640	7004	7368	7731	8094	8457	8819	363
120	079181	9543	9904	*0266	*0626	*0987	*1347	*1707	*2067	*2426	360
121	082785	3144	3503	3861	4219	4576	4934	5291	5647	6004	357
122	6360	6716	7071	7426	7781	8136	8490	8845	9198	9552	355
123	9905	*0258	*0611	*0963	*1315	*1667	*2018	*2370	*2721	*3071	352
124	093422	3772	4122	4471	4820	5169	5518	5866	6215	6562	349

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	387	39	77	116	155	194	232	271	310	348	387
	386	39	77	116	154	193	232	270	309	347	386
	385	39	77	116	154	193	231	270	308	347	385
	384	38	77	115	154	192	230	269	307	346	384
	383	38	77	115	153	192	230	268	306	345	383
	382	38	76	115	153	191	229	267	306	344	382
	381	38	76	114	152	191	229	267	305	343	381
	380	38	76	114	152	190	228	266	304	342	380
	379	38	76	114	152	190	227	265	303	341	379
	378	38	76	113	151	189	227	265	302	340	378
	377	38	75	113	151	189	226	264	302	339	377
	376	38	75	113	150	188	226	263	301	338	376
	375	38	75	113	150	188	225	263	300	338	375
	374	37	75	112	150	187	224	262	299	337	374
	373	37	75	112	149	187	224	261	298	336	373
	372	37	74	112	149	186	223	260	298	335	372
	371	37	74	111	148	186	223	260	297	334	371
	370	37	74	111	148	185	222	259	296	333	370
	369	37	74	111	148	185	221	258	295	332	369
	368	37	74	110	147	184	221	258	294	331	368
	367	37	73	110	147	184	220	257	294	330	367
	366	37	73	110	146	183	220	256	293	329	366
	365	37	73	110	146	183	219	256	292	329	365
	364	36	73	109	146	182	218	255	291	328	364
	363	36	73	109	145	182	218	254	290	327	363
	362	36	72	109	145	181	217	253	290	326	362
	361	36	72	108	144	181	217	253	289	325	361
	360	36	72	108	144	180	216	252	288	324	360
	359	36	72	108	144	180	215	251	287	323	359
	358	36	72	107	143	179	215	251	286	322	358
	357	36	71	107	143	179	214	250	286	321	357
	356	36	71	107	142	178	214	249	285	320	356
	355	36	71	107	142	178	213	249	284	320	355
	354	35	71	106	142	177	212	248	283	319	354
	353	35	71	106	141	177	212	247	282	318	353
	352	35	70	106	141	176	211	246	282	317	352
	351	35	70	105	140	176	211	246	281	316	351
	350	35	70	105	140	175	210	245	280	315	350
	349	35	70	105	140	175	209	244	279	314	349
	348	35	70	104	139	174	209	244	278	313	348
	347	35	69	104	139	174	208	243	278	312	347
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
125	096910	7257	7604	7951	8298	8644	8990	9335	9681	*0026	346
126	100371	0715	1059	1403	1747	2091	2434	2777	3119	3462	343
127	3804	4146	4487	4828	5169	5510	5851	6191	6531	6871	341
128	7210	7549	7888	8227	8565	8903	9241	9579	9916	*0253	338
129	110590	0926	1263	1599	1934	2270	2605	2940	3275	3609	335
130	113943	4277	4611	4944	5278	5611	5943	6276	6608	6940	333
131	7271	7603	7934	8265	8595	8926	9256	9586	9915	*0245	330
132	120574	0903	1231	1560	1888	2216	2544	2871	3198	3525	328
133	3852	4178	4504	4830	5156	5481	5806	6131	6456	6781	325
134	7105	7429	7753	8076	8399	8722	9045	9368	9690	*0012	323
135	130334	0655	0977	1298	1619	1939	2260	2580	2900	3219	321
136	3539	3858	4177	4496	4814	5133	5451	5769	6086	6403	318
137	6721	7037	7354	7671	7987	8303	8618	8934	9249	9564	316
138	9879	*0194	*0508	*0822	*1136	*1450	*1763	*2076	*2389	*2702	314
139	143015	3327	3639	3951	4263	4574	4885	5196	5507	5818	311

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	347	35	69	104	139	174	208	243	278	312	347
	346	35	69	104	138	173	208	242	277	311	346
	345	35	69	104	138	173	207	242	276	311	345
	344	34	69	103	138	172	206	241	275	310	344
	343	34	69	103	137	172	206	240	274	309	343
	342	34	68	103	137	171	205	239	274	308	342
	341	34	68	102	136	171	205	239	273	307	341
	340	34	68	102	136	170	204	238	272	306	340
	339	34	68	102	136	170	203	237	271	305	339
	338	34	68	101	135	169	203	237	270	304	338
	337	34	67	101	135	169	202	236	270	303	337
	336	34	67	101	134	168	202	235	269	302	336
	335	34	67	101	134	168	201	235	268	302	335
	334	33	67	100	134	167	200	234	267	301	334
	333	33	67	100	133	167	200	233	266	300	333
	332	33	66	100	133	166	199	232	266	299	332
	331	33	66	99	132	166	199	232	265	298	331
	330	33	66	99	132	165	198	231	264	297	330
	329	33	66	99	132	165	197	230	263	296	329
	328	33	66	98	131	164	197	230	262	295	328
	327	33	65	98	131	164	196	229	262	294	327
	326	33	65	98	130	163	196	228	261	293	326
	325	33	65	98	130	163	195	228	260	293	325
	324	32	65	97	130	162	194	227	259	292	324
	323	32	65	97	129	162	194	226	258	291	323
	322	32	64	97	129	161	193	225	258	290	322
	321	32	64	96	128	161	193	225	257	289	321
	320	32	64	96	128	160	192	224	256	288	320
	319	32	64	96	128	160	191	223	255	287	319
	318	32	64	95	127	159	191	223	254	286	318
	317	32	63	95	127	159	190	222	254	285	317
	316	32	63	95	126	158	190	221	253	284	316
	315	32	63	95	126	158	189	221	252	284	315
	314	31	63	94	126	157	188	220	251	283	314
	313	31	63	94	125	157	188	219	250	282	313
	312	31	62	94	125	156	187	218	250	281	312
	311	31	62	93	124	156	187	218	249	280	311
	310	31	62	93	124	155	186	217	248	279	310
	309	31	62	93	124	155	185	216	247	278	309
	308	31	62	92	123	154	185	216	246	277	308
	307	31	61	92	123	154	184	215	246	276	307
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
140	146128	6438	6748	7058	7367	7676	7985	8294	8603	8911	309
141	9219	9527	9835	*0142	*0449	*0756	*1063	*1370	*1676	*1982	307
142	152288	2594	2900	3205	3510	3815	4120	4424	4728	5032	305
143	5336	5640	5943	6246	6549	6852	7154	7457	7759	8061	303
144	8362	8664	8965	9266	9567	9868	*0168	*0469	*0769	*1068	301
145	161368	1667	1967	2266	2564	2863	3161	3460	3758	4055	299
146	4353	4650	4947	5244	5541	5838	6134	6430	6726	7022	297
147	7317	7613	7908	8203	8497	8792	9086	9380	9674	9968	295
148	170262	0555	0848	1141	1434	1726	2019	2311	2603	2895	293
149	3186	3478	3769	4060	4351	4641	4932	5222	5512	5802	291
150	176091	6381	6670	6959	7248	7536	7825	8113	8401	8689	289
151	8977	9264	9552	9839	*0126	*0413	*0699	*0986	*1272	*1558	287
152	181844	2129	2415	2700	2985	3270	3555	3839	4123	4407	285
153	4691	4975	5259	5542	5825	6108	6391	6674	6956	7239	283
154	7521	7803	8084	8366	8647	8928	9209	9490	9771	*0051	281
155	190332	0612	0892	1171	1451	1730	2010	2289	2567	2846	279
156	3125	3403	3681	3959	4237	4514	4792	5069	5346	5623	278
157	5900	6176	6453	6729	7005	7281	7556	7832	8107	8382	276
158	8657	8932	9206	9481	9755	*0029	*0303	*0577	*0850	*1124	274
159	201397	1670	1943	2216	2488	2761	3033	3305	3577	3848	272

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N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	306	31	61	92	122	153	184	214	245	275	306
	305	31	61	92	122	153	183	214	244	275	305
	304	30	61	91	122	152	182	213	243	274	304
	303	30	61	91	121	152	182	212	242	273	303
	302	30	60	91	121	151	181	211	242	272	302
	301	30	60	90	120	151	181	211	241	271	301
	300	30	60	90	120	150	180	210	240	270	300
	299	30	60	90	120	150	179	209	239	269	299
	298	30	60	89	119	149	179	209	238	268	298
	297	30	59	89	119	149	178	208	238	267	297
	296	30	59	89	118	148	178	207	237	266	296
	295	30	59	89	118	148	177	207	236	266	295
	294	29	59	88	118	147	176	206	235	265	294
	293	29	59	88	117	147	176	205	234	264	293
	292	29	58	88	117	146	175	204	234	263	292
	291	29	58	87	116	146	175	204	233	262	291
	290	29	58	87	116	145	174	203	232	261	290
	289	29	58	87	116	145	173	202	231	260	289
	288	29	58	86	115	144	173	202	230	259	288
	287	29	57	86	115	144	172	201	230	258	287
	286	29	57	86	114	143	172	200	229	257	286
	285	29	57	86	114	143	171	200	228	257	285
	284	28	57	85	114	142	170	199	227	256	284
	283	28	57	85	113	142	170	198	226	255	283
	282	28	56	85	113	141	169	197	226	254	282
	281	28	56	84	112	141	169	197	225	253	281
	280	28	56	84	112	140	168	196	224	252	280
	279	28	56	84	112	140	167	195	223	251	279
	278	28	56	83	111	139	167	195	222	250	278
	277	28	55	83	111	139	166	194	222	249	277
	276	28	55	83	110	138	166	193	221	248	276
	275	28	55	83	110	138	165	193	220	248	275
	274	27	55	82	110	137	164	192	219	247	274
	273	27	55	82	109	137	164	191	218	246	273
	272	27	54	82	109	136	163	190	218	245	272
	271	27	54	81	108	136	163	190	217	244	271
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
160	204120	4391	4663	4934	5204	5475	5746	6016	6286	6556	271
161	6826	7096	7365	7634	7904	8173	8441	8710	8979	9247	269
162	9515	9783	*0051	*0319	*0586	*0853	*1121	*1388	*1654	*1921	267
163	212188	2454	2720	2986	3252	3518	3783	4049	4314	4579	266
164	4844	5109	5373	5638	5902	6166	6430	6694	6957	7221	264
165	217484	7747	8010	8273	8536	8798	9060	9323	9585	9846	262
166	220108	0370	0631	0892	1153	1414	1675	1936	2196	2456	261
167	2716	2976	3236	3496	3755	4015	4274	4533	4792	5051	259
168	5309	5568	5826	6084	6342	6600	6858	7115	7372	7630	258
169	7887	8144	8400	8657	8913	9170	9426	9682	9938	*0193	256
170	230449	0704	0960	1215	1470	1724	1979	2234	2488	2742	255
171	2996	3250	3504	3757	4011	4264	4517	4770	5023	5276	253
172	5528	5781	6033	6285	6537	6789	7041	7292	7544	7795	252
173	8046	8297	8548	8799	9049	9299	9550	9800	*0050	*0300	250
174	240549	0799	1048	1297	1546	1795	2044	2293	2541	2790	249
175	243038	3286	3534	3782	4030	4277	4525	4772	5019	5266	248
176	5513	5759	6006	6252	6499	6745	6991	7237	7482	7728	246
177	7973	8219	8464	8709	8954	9198	9443	9687	9932	*0176	245
178	250420	0664	0908	1151	1395	1638	1881	2125	2368	2610	243
179	2853	3096	3338	3580	3822	4064	4306	4548	4790	5031	242

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	272	27	54	82	109	136	163	190	218	245	272
	271	27	54	81	108	136	163	190	217	244	271
	270	27	54	81	108	135	162	189	216	243	270
	269	27	54	81	108	135	161	188	215	242	269
	268	27	54	80	107	134	161	188	214	241	268
	267	27	53	80	107	134	160	187	214	240	267
	266	27	53	80	106	133	160	186	213	239	266
	265	27	53	80	106	133	159	186	212	239	265
	264	26	53	79	106	132	158	185	211	238	264
	263	26	53	79	105	132	158	184	210	237	263
	262	26	52	79	105	131	157	183	210	236	262
	261	26	52	78	104	131	157	183	209	235	261
	260	26	52	78	104	130	156	182	208	234	260
	259	26	52	78	104	130	155	181	207	233	259
	258	26	52	77	103	129	155	181	206	232	258
	257	26	51	77	103	129	154	180	206	231	257
	256	26	51	77	102	128	154	179	205	230	256
	255	26	51	77	102	128	153	179	204	230	255
	254	25	51	76	102	127	152	178	203	229	254
	253	25	51	76	101	127	152	177	202	228	253
	252	25	50	76	101	126	151	176	202	227	252
	251	25	50	75	100	126	151	176	201	226	251
	250	25	50	75	100	125	150	175	200	225	250
	249	25	50	75	100	125	149	174	199	224	249
	248	25	50	74	99	124	149	174	198	223	248
	247	25	49	74	99	124	148	173	198	222	247
	246	25	49	74	98	123	148	172	197	221	246
	245	25	49	74	98	123	147	172	196	221	245
	244	24	49	73	98	122	146	171	195	220	244
	243	24	49	73	97	122	146	170	194	219	243
	242	24	48	73	97	121	145	169	194	218	242
	241	24	48	72	96	121	145	169	193	217	241
	240	24	48	72	96	120	144	168	192	216	240
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
180	255273	5514	5755	5996	6237	6477	6718	6958	7198	7439	241
181	7679	7918	8158	8398	8637	8877	9116	9355	9594	9833	239
182	260071	0310	0548	0787	1025	1263	1501	1739	1976	2214	238
183	2451	2688	2925	3162	3399	3636	3873	4109	4346	4582	237
184	4818	5054	5290	5525	5761	5996	6232	6467	6702	6937	235
185	267172	7406	7641	7875	8110	8344	8578	8812	9046	9279	234
186	9513	9746	9980	*0213	*0446	*0679	*0912	*1144	*1377	*1609	233
187	271842	2074	2306	2538	2770	3001	3233	3464	3696	3927	232
188	4158	4389	4620	4850	5081	5311	5542	5772	6002	6232	230
189	6462	6692	6921	7151	7380	7609	7838	8067	8296	8525	229
190	278754	8982	9211	9439	9667	9895	*0123	*0351	*0578	*0806	228
191	281033	1261	1488	1715	1942	2169	2396	2622	2849	3075	227
192	3301	3527	3753	3979	4205	4431	4656	4882	5107	5332	226
193	5557	5782	6007	6232	6456	6681	6905	7130	7354	7578	225
194	7802	8026	8249	8473	8696	8920	9143	9366	9589	9812	223
195	290035	0257	0480	0702	0925	1147	1369	1591	1813	2034	222
196	2256	2478	2699	2920	3141	3363	3584	3804	4025	4246	221
197	4466	4687	4907	5127	5347	5567	5787	6007	6226	6446	220
198	6665	6884	7104	7323	7542	7761	7979	8198	8416	8635	219
199	8853	9071	9289	9507	9725	9943	*0161	*0378	*0595	*0813	218
200	301030	1247	1464	1681	1898	2114	2331	2547	2764	2980	217
201	3196	3412	3628	3844	4059	4275	4491	4706	4921	5136	216
202	5351	5566	5781	5996	6211	6425	6639	6854	7068	7282	215
203	7496	7710	7924	8137	8351	8564	8778	8991	9204	9417	213
204	9630	9843	*0056	*0268	*0481	*0693	*0906	*1118	*1330	*1542	212

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	239	24	48	72	96	120	143	167	191	215	239
	238	24	48	71	95	119	143	167	190	214	238
	237	24	47	71	95	119	142	166	190	213	237
	236	24	47	71	94	118	142	165	189	212	236
	235	24	47	71	94	118	141	165	188	212	235
	234	23	47	70	94	117	140	164	187	211	234
	233	23	47	70	93	117	140	163	186	210	233
	232	23	46	70	93	116	139	162	186	209	232
	231	23	46	69	92	116	139	162	185	208	231
	230	23	46	69	92	115	138	161	184	207	230
	229	23	46	69	92	115	137	160	183	206	229
	228	23	46	68	91	114	137	160	182	205	228
	227	23	45	68	91	114	136	159	182	204	227
	226	23	45	68	90	113	136	158	181	203	226
	225	23	45	68	90	113	135	158	180	203	225
	224	22	45	67	90	112	134	157	179	202	224
	223	22	45	67	89	112	134	156	178	201	223
	222	22	44	67	89	111	133	155	178	200	222
	221	22	44	66	88	111	133	155	177	199	221
	220	22	44	66	88	110	132	154	176	198	220
	219	22	44	66	88	110	131	153	175	197	219
	218	22	44	65	87	109	131	153	174	196	218
	217	22	43	65	87	109	130	152	174	195	217
	216	22	43	65	86	108	130	151	173	194	216
	215	22	43	65	86	108	129	151	172	194	215
	214	21	43	64	86	107	128	150	171	193	214
	213	21	43	64	85	107	128	149	170	192	213
	212	21	42	64	85	106	127	148	170	191	212
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
205	311754	1966	2177	2389	2600	2812	3023	3234	3445	3656	211
206	3867	4078	4289	4499	4710	4920	5130	5340	5551	5760	210
207	5970	6180	6390	6599	6809	7018	7227	7436	7646	7854	209
208	8063	8272	8481	8689	8898	9106	9314	9522	9730	9938	208
209	320146	0354	0562	0769	0977	1184	1391	1598	1805	2012	207
210	322219	2426	2633	2839	3046	3252	3458	3665	3871	4077	206
211	4282	4488	4694	4899	5105	5310	5516	5721	5926	6131	205
212	6336	6541	6745	6950	7155	7359	7563	7767	7972	8176	204
213	8380	8583	8787	8991	9194	9398	9601	9805	*0008	*0211	203
214	330414	0617	0819	1022	1225	1427	1630	1832	2034	2236	202
215	332438	2640	2842	3044	3246	3447	3649	3850	4051	4253	202
216	4454	4655	4856	5057	5257	5458	5658	5859	6059	6260	201
217	6460	6660	6860	7060	7260	7459	7659	7858	8058	8257	200
218	8456	8656	8855	9054	9253	9451	9650	9849	*0047	*0246	199
219	340444	0642	0841	1039	1237	1435	1632	1830	2028	2225	198
220	342423	2620	2817	3014	3212	3409	3606	3802	3999	4196	197
221	4392	4589	4785	4981	5178	5374	5570	5766	5962	6157	196
222	6353	6549	6744	6939	7135	7330	7525	7720	7915	8110	195
223	8305	8500	8694	8889	9083	9278	9472	9666	9860	*0054	194
224	350248	0442	0636	0829	1023	1216	1410	1603	1796	1989	193
225	352183	2375	2568	2761	2954	3147	3339	3532	3724	3916	193
226	4108	4301	4493	4685	4876	5068	5260	5452	5643	5834	192
227	6026	6217	6408	6599	6790	6981	7172	7363	7554	7744	191
228	7935	8125	8316	8506	8696	8886	9076	9266	9456	9646	190
229	9835	*0025	*0215	*0404	*0593	*0783	*0972	*1161	*1350	*1539	189
230	361728	1917	2105	2294	2482	2671	2859	3048	3236	3424	188
231	3612	3800	3988	4176	4363	4551	4739	4926	5113	5301	188
232	5488	5675	5862	6049	6236	6423	6610	6796	6983	7169	187
233	7356	7542	7729	7915	8101	8287	8473	8659	8845	9030	186
234	9216	9401	9587	9772	9958	*0143	*0328	*0513	*0698	*0883	185

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	212	21	42	64	85	106	127	148	170	191	212
	211	21	42	63	84	106	127	148	169	190	211
	210	21	42	63	84	105	126	147	168	189	210
	209	21	42	63	84	105	125	146	167	188	209
	208	21	42	62	83	104	125	146	166	187	208
	207	21	41	62	83	104	124	145	166	186	207
	206	21	41	62	82	103	124	144	165	185	206
	205	21	41	62	82	103	123	144	164	185	205
	204	20	41	61	82	102	122	143	163	184	204
	203	20	41	61	81	102	122	142	162	183	203
	202	20	40	61	81	101	121	141	162	182	202
	201	20	40	60	80	101	121	141	161	181	201
	200	20	40	60	80	100	120	140	160	180	200
	199	20	40	60	80	100	119	139	159	179	199
	198	20	40	59	79	99	119	139	158	178	198
	197	20	39	59	79	99	118	138	158	177	197
	196	20	39	59	78	98	118	137	157	176	196
	195	20	39	59	78	98	117	137	156	176	195
	194	19	39	58	78	97	116	136	155	175	194
	193	19	39	58	77	97	116	135	154	174	193
	192	19	38	58	77	96	115	134	154	173	192
	191	19	38	57	76	96	115	134	153	172	191
	190	19	38	57	76	95	114	133	152	171	190
	189	19	38	57	76	95	113	132	151	170	189
	188	19	38	56	75	94	113	132	150	169	188
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
235	371068	1253	1437	1622	1806	1991	2175	2360	2544	2728	184
236	2912	3096	3280	3464	3647	3831	4015	4198	4382	4565	184
237	4748	4932	5115	5298	5481	5664	5846	6029	6212	6394	183
238	6577	6759	6942	7124	7306	7488	7670	7852	8034	8216	182
239	8398	8580	8761	8943	9124	9306	9487	9668	9849	*0030	181
240	380211	0392	0573	0754	0934	1115	1296	1476	1656	1837	181
241	2017	2197	2377	2557	2737	2917	3097	3277	3456	3636	180
242	3815	3995	4174	4353	4533	4712	4891	5070	5249	5428	179
243	5606	5785	5964	6142	6321	6499	6677	6856	7034	7212	178
244	7390	7568	7746	7923	8101	8279	8456	8634	8811	8989	178
245	389166	9343	9520	9698	9875	*0051	*0228	*0405	*0582	*0759	177
246	390935	1112	1288	1464	1641	1817	1993	2169	2345	2521	176
247	2697	2873	3048	3224	3400	3575	3751	3926	4101	4277	176
248	4452	4627	4802	4977	5152	5326	5501	5676	5850	6025	175
249	6199	6374	6548	6722	6896	7071	7245	7419	7592	7766	174
250	397940	8114	8287	8461	8634	8808	8981	9154	9328	9501	173
251	9674	9847	*0020	*0192	*0365	*0538	*0711	*0883	*1056	*1228	173
252	401401	1573	1745	1917	2089	2261	2433	2605	2777	2949	172
253	3121	3292	3464	3635	3807	3978	4149	4320	4492	4663	171
254	4834	5005	5176	5346	5517	5688	5858	6029	6199	6370	171
255	406540	6710	6881	7051	7221	7391	7561	7731	7901	8070	170
256	8240	8410	8579	8749	8918	9087	9257	9426	9595	9764	169
257	9933	*0102	*0271	*0440	*0609	*0777	*0946	*1114	*1283	*1451	169
258	411620	1788	1956	2124	2293	2461	2629	2796	2964	3132	168
259	3300	3467	3635	3803	3970	4137	4305	4472	4639	4806	167
260	414973	5140	5307	5474	5641	5808	5974	6141	6308	6474	167
261	6641	6807	6973	7139	7306	7472	7638	7804	7970	8135	166
262	8301	8467	8633	8798	8964	9129	9295	9460	9625	9791	165
263	9956	*0121	*0286	*0451	*0616	*0781	*0945	*1110	*1275	*1439	165
264	421604	1768	1933	2097	2261	2426	2590	2754	2918	3082	164

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	187	19	37	56	75	94	112	131	150	168	187
	186	19	37	56	74	93	112	130	149	167	186
	185	19	37	56	74	93	111	130	148	167	185
	184	18	37	55	74	92	110	129	147	166	184
	183	18	37	55	73	92	110	128	146	165	183
	182	18	36	55	73	91	109	127	146	164	182
	181	18	36	54	72	91	109	127	145	163	181
	180	18	36	54	72	90	108	126	144	162	180
	179	18	36	54	72	90	107	125	143	161	179
	178	18	36	53	71	89	107	125	142	160	178
	177	18	35	53	71	89	106	124	142	159	177
	176	18	35	53	70	88	106	123	141	158	176
	175	18	35	53	70	88	105	123	140	158	175
	174	17	35	52	70	87	104	122	139	157	174
	173	17	35	52	69	87	104	121	138	156	173
	172	17	34	52	69	86	103	120	138	155	172
	171	17	34	51	68	86	103	120	137	154	171
	170	17	34	51	68	85	102	119	136	153	170
	169	17	34	51	68	85	101	118	135	152	169
	168	17	34	50	67	84	101	118	134	151	168
	167	17	33	50	67	84	100	117	134	150	167
	166	17	33	50	66	83	100	116	133	149	166
	165	17	33	50	66	83	99	116	132	149	165
	164	16	33	49	66	82	98	115	131	148	164
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
265	423246	3410	3574	3737	3901	4065	4228	4392	4555	4718	164
266	4882	5045	5208	5371	5534	5697	5860	6023	6186	6349	163
267	6511	6674	6836	6999	7161	7324	7486	7648	7811	7973	162
268	8135	8297	8459	8621	8783	8944	9106	9268	9429	9591	162
269	9752	9914	*0075	*0236	*0398	*0559	*0720	*0881	*1042	*1203	161
270	431364	1525	1685	1846	2007	2167	2328	2488	2649	2809	161
271	2969	3130	3290	3450	3610	3770	3930	4090	4249	4409	160
272	4569	4729	4888	5048	5207	5367	5526	5685	5844	6004	159
273	6163	6322	6481	6640	6799	6957	7116	7275	7433	7592	159
274	7751	7909	8067	8226	8384	8542	8701	8859	9017	9175	158
275	439333	9491	9648	9806	9964	*0122	*0279	*0437	*0594	*0752	158
276	440909	1066	1224	1381	1538	1695	1852	2009	2166	2323	157
277	2480	2637	2793	2950	3106	3263	3419	3576	3732	3889	157
278	4045	4201	4357	4513	4669	4825	4981	5137	5293	5449	156
279	5604	5760	5915	6071	6226	6382	6537	6692	6848	7003	155
280	447158	7313	7468	7623	7778	7933	8088	8242	8397	8552	155
281	8706	8861	9015	9170	9324	9478	9633	9787	9941	*0095	154
282	450249	0403	0557	0711	0865	1018	1172	1326	1479	1633	154
283	1786	1940	2093	2247	2400	2553	2706	2859	3012	3165	153
284	3318	3471	3624	3777	3930	4082	4235	4387	4540	4692	153
285	454845	4997	5150	5302	5454	5606	5758	5910	6062	6214	152
286	6366	6518	6670	6821	6973	7125	7276	7428	7579	7731	152
287	7882	8033	8184	8336	8487	8638	8789	8940	9091	9242	151
288	9392	9543	9694	9845	9995	*0146	*0296	*0447	*0597	*0748	151
289	460898	1048	1198	1348	1499	1649	1799	1948	2098	2248	150
290	462398	2548	2697	2847	2997	3146	3296	3445	3594	3744	150
291	3893	4042	4191	4340	4490	4639	4788	4936	5085	5234	149
292	5383	5532	5680	5829	5977	6126	6274	6423	6571	6719	149
293	6868	7016	7164	7312	7460	7608	7756	7904	8052	8200	148
294	8347	8495	8643	8790	8938	9085	9233	9380	9527	9675	148
295	469822	9969	*0116	*0263	*0410	*0557	*0704	*0851	*0998	*1145	147
296	471292	1438	1585	1732	1878	2025	2171	2318	2464	2610	146
297	2756	2903	3049	3195	3341	3487	3633	3779	3925	4071	146
298	4216	4362	4508	4653	4799	4944	5090	5235	5381	5526	146
299	5671	5816	5962	6107	6252	6397	6542	6687	6832	6976	145

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	164	16	33	49	66	82	98	115	131	148	164
	163	16	33	49	65	82	98	114	130	147	163
	162	16	32	49	65	81	97	113	130	146	162
	161	16	32	48	64	81	97	113	129	145	161
	160	16	32	48	64	80	96	112	128	144	160
	159	16	32	48	64	80	95	111	127	143	159
	158	16	32	47	63	79	95	111	126	142	158
	157	16	31	47	63	79	94	110	126	141	157
	156	16	31	47	62	78	94	109	125	140	156
	155	16	31	47	62	78	93	109	124	140	155
	154	15	31	46	62	77	92	108	123	139	154
	153	15	31	46	61	77	92	107	122	138	153
	152	15	30	46	61	76	91	106	122	137	152
	151	15	30	45	60	76	91	106	121	136	151
	150	15	30	45	60	75	90	105	120	135	150
	149	15	30	45	60	75	89	104	119	134	149
	148	15	30	44	59	74	89	104	118	133	148
	147	15	29	44	59	74	88	103	118	132	147
	146	15	29	44	58	73	88	102	117	131	146
	145	15	29	44	58	73	87	102	116	131	145
	144	14	29	43	58	72	86	101	115	130	144
	143	14	29	43	57	72	86	100	114	129	143
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
300	477121	7266	7411	7555	7700	7844	7989	8133	8278	8422	145
301	8566	8711	8855	8999	9143	9287	9431	9575	9719	9863	144
302	480007	0151	0294	0438	0582	0725	0869	1012	1156	1299	144
303	1443	1586	1729	1872	2016	2159	2302	2445	2588	2731	143
304	2874	3016	3159	3302	3445	3587	3730	3872	4015	4157	143
305	484300	4442	4585	4727	4869	5011	5153	5295	5437	5579	142
306	5721	5863	6005	6147	6289	6430	6572	6714	6855	6997	142
307	7138	7280	7421	7563	7704	7845	7986	8127	8269	8410	141
308	8551	8692	8833	8974	9114	9255	9396	9537	9677	9818	141
309	9958	*0099	*0239	*0380	*0520	*0661	*0801	*0941	*1081	*1222	140
310	491362	1502	1642	1782	1922	2062	2201	2341	2481	2621	140
311	2760	2900	3040	3179	3319	3458	3597	3737	3876	4015	139
312	4155	4294	4433	4572	4711	4850	4989	5128	5267	5406	139
313	5544	5683	5822	5960	6099	6238	6376	6515	6653	6791	139
314	6930	7068	7206	7344	7483	7621	7759	7897	8035	8173	138
315	498311	8448	8586	8724	8862	8999	9137	9275	9412	9550	138
316	9687	9824	9962	*0099	*0236	*0374	*0511	*0648	*0785	*0922	137
317	501059	1196	1333	1470	1607	1744	1880	2017	2154	2291	137
318	2427	2564	2700	2837	2973	3109	3246	3382	3518	3655	136
319	3791	3927	4063	4199	4335	4471	4607	4743	4878	5014	136
320	505150	5286	5421	5557	5693	5828	5964	6099	6234	6370	136
321	6505	6640	6776	6911	7046	7181	7316	7451	7586	7721	135
322	7856	7991	8126	8260	8395	8530	8664	8799	8934	9068	135
323	9203	9337	9471	9606	9740	9874	*0009	*0143	*0277	*0411	134
324	510545	0679	0813	0947	1081	1215	1349	1482	1616	1750	134
325	511883	2017	2151	2284	2418	2551	2684	2818	2951	3084	133
326	3218	3351	3484	3617	3750	3883	4016	4149	4282	4415	133
327	4548	4681	4813	4946	5079	5211	5344	5476	5609	5741	133
328	5874	6006	6139	6271	6403	6535	6668	6800	6932	7064	132
329	7196	7328	7460	7592	7724	7855	7987	8119	8251	8382	132
330	518514	8646	8777	8909	9040	9171	9303	9434	9566	9697	131
331	9828	9959	*0090	*0221	*0353	*0484	*0615	*0745	*0876	*1007	131
332	521138	1269	1400	1530	1661	1792	1922	2053	2183	2314	131
333	2444	2575	2705	2835	2966	3096	3226	3356	3486	3616	130
334	3746	3876	4006	4136	4266	4396	4526	4656	4785	4915	130
335	525045	5174	5304	5434	5563	5693	5822	5951	6081	6210	129
336	6339	6469	6598	6727	6856	6985	7114	7243	7372	7501	129
337	7630	7759	7888	8016	8145	8274	8402	8531	8660	8788	129
338	8917	9045	9174	9302	9430	9559	9687	9815	9943	*0072	128
339	530200	0328	0456	0584	0712	0840	0968	1096	1223	1351	128

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROPORTIONAL PARTS	142	14	28	43	57	71	85	99	114	128	142
	141	14	28	42	56	71	85	99	113	127	141
	140	14	28	42	56	70	84	98	112	126	140
	139	14	28	42	56	70	83	97	111	125	139
	138	14	28	41	55	69	83	97	110	124	138
	137	14	27	41	55	69	82	96	110	123	137
	136	14	27	41	54	68	82	95	109	122	136
	135	14	27	41	54	68	81	95	108	122	135
	134	13	27	40	54	67	80	94	107	121	134
	133	13	27	40	53	67	80	93	106	120	133
	132	13	26	40	53	66	79	92	106	119	132
	131	13	26	39	52	66	79	92	105	118	131
	130	13	26	39	52	65	78	91	104	117	130
	129	13	26	39	52	65	77	90	103	116	129
	128	13	26	38	51	64	77	90	102	115	128
	127	13	25	38	51	64	76	89	102	114	127
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
340	531479	1607	1734	1862	1990	2117	2245	2372	2500	2627	128
341	2754	2882	3009	3136	3264	3391	3518	3645	3772	3899	127
342	4026	4153	4280	4407	4534	4661	4787	4914	5041	5167	127
343	5294	5421	5547	5674	5800	5927	6053	6180	6306	6432	126
344	6558	6685	6811	6937	7063	7189	7315	7441	7567	7693	126
345	537819	7945	8071	8197	8322	8448	8574	8699	8825	8951	126
346	9076	9202	9327	9452	9578	9703	9829	9954	*0079	*0204	125
347	540329	0455	0580	0705	0830	0955	1080	1205	1330	1454	125
348	1579	1704	1829	1953	2078	2203	2327	2452	2576	2701	125
349	2825	2950	3074	3199	3323	3447	3571	3696	3820	3944	124
350	544068	4192	4316	4440	4564	4688	4812	4936	5060	5183	124
351	5307	5431	5555	5678	5802	5925	6049	6172	6296	6419	124
352	6543	6666	6789	6913	7036	7159	7282	7405	7529	7652	123
353	7775	7898	8021	8144	8267	8389	8512	8635	8758	8881	123
354	9003	9126	9249	9371	9494	9616	9739	9861	9984	*0106	123
355	550228	0351	0473	0595	0717	0840	0962	1084	1206	1328	122
356	1450	1572	1694	1816	1938	2060	2181	2303	2425	2547	122
357	2668	2790	2911	3033	3155	3276	3398	3519	3640	3762	121
358	3883	4004	4126	4247	4368	4489	4610	4731	4852	4973	121
359	5094	5215	5336	5457	5578	5699	5820	5940	6061	6182	121
360	556303	6423	6544	6664	6785	6905	7026	7146	7267	7387	120
361	7507	7627	7748	7868	7988	8108	8228	8349	8469	8589	120
362	8709	8829	8948	9068	9188	9308	9428	9548	9667	9787	120
363	9907	*0026	*0146	*0265	*0385	*0504	*0624	*0743	*0863	*0982	119
364	561101	1221	1340	1459	1578	1698	1817	1936	2055	2174	119
365	562293	2412	2531	2650	2769	2887	3006	3125	3244	3362	119
366	3481	3600	3718	3837	3955	4074	4192	4311	4429	4548	119
367	4666	4784	4903	5021	5139	5257	5376	5494	5612	5730	118
368	5848	5966	6084	6202	6320	6437	6555	6673	6791	6909	118
369	7026	7144	7262	7379	7497	7614	7732	7849	7967	8084	118
370	568202	8319	8436	8554	8671	8788	8905	9023	9140	9257	117
371	9374	9491	9608	9725	9842	9959	*0076	*0193	*0309	*0426	117
372	570543	0660	0776	0893	1010	1126	1243	1359	1476	1592	117
373	1709	1825	1942	2058	2174	2291	2407	2523	2639	2755	116
374	2872	2988	3104	3220	3336	3452	3568	3684	3800	3915	116
375	574031	4147	4263	4379	4494	4610	4726	4841	4957	5072	116
376	5188	5303	5419	5534	5650	5765	5880	5996	6111	6226	115
377	6341	6457	6572	6687	6802	6917	7032	7147	7262	7377	115
378	7492	7607	7722	7836	7951	8066	8181	8295	8410	8525	115
379	8639	8754	8868	8983	9097	9212	9326	9441	9555	9669	114

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROP. PARTS	128	13	26	38	51	64	77	90	102	115	128
	127	13	25	38	51	64	76	89	102	114	127
	126	13	25	38	50	63	76	88	101	113	126
	125	13	25	38	50	63	75	88	100	113	125
	124	12	25	37	50	62	74	87	99	112	124
	123	12	25	37	49	62	74	86	98	111	123
	122	12	24	37	49	61	73	85	98	110	122
	121	12	24	36	48	61	73	85	97	109	121
	120	12	24	36	48	60	72	84	96	108	120
	119	12	24	36	48	60	71	83	95	107	119
	118	12	24	35	47	59	71	83	94	106	118
	117	12	23	35	47	59	70	82	94	105	117
	116	12	23	35	46	58	70	81	93	104	116
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
380	579784	9898	*0012	*0126	*0241	*0355	*0469	*0583	*0697	*0811	114
381	580925	1039	1153	1267	1381	1495	1608	1722	1836	1950	114
382	2063	2177	2291	2404	2518	2631	2745	2858	2972	3085	114
383	3199	3312	3426	3539	3652	3765	3879	3992	4105	4218	113
384	4331	4444	4557	4670	4783	4896	5009	5122	5235	5348	113
385	585461	5574	5686	5799	5912	6024	6137	6250	6362	6475	113
386	6587	6700	6812	6925	7037	7149	7262	7374	7486	7599	112
387	7711	7823	7935	8047	8160	8272	8384	8496	8608	8720	112
388	8832	8944	9056	9167	9279	9391	9503	9615	9726	9838	112
389	9950	*0061	*0173	*0284	*0396	*0507	*0619	*0730	*0842	*0953	112
390	591065	1176	1287	1399	1510	1621	1732	1843	1955	2066	111
391	2177	2288	2399	2510	2621	2732	2843	2954	3064	3175	111
392	3286	3397	3508	3618	3729	3840	3950	4061	4171	4282	111
393	4393	4503	4614	4724	4834	4945	5055	5165	5276	5386	110
394	5496	5606	5717	5827	5937	6047	6157	6267	6377	6487	110
395	596597	6707	6817	6927	7037	7146	7256	7366	7476	7586	110
396	7695	7805	7914	8024	8134	8243	8353	8462	8572	8681	110
397	8791	8900	9009	9119	9228	9337	9446	9556	9665	9774	109
398	9883	9992	*0101	*0210	*0319	*0428	*0537	*0646	*0755	*0864	109
399	600973	1082	1191	1299	1408	1517	1625	1734	1843	1951	109
400	602060	2169	2277	2386	2494	2603	2711	2819	2928	3036	108
401	3144	3253	3361	3469	3577	3686	3794	3902	4010	4118	108
402	4226	4334	4442	4550	4658	4766	4874	4982	5089	5197	108
403	5305	5413	5521	5628	5736	5844	5951	6059	6166	6274	108
404	6381	6489	6596	6704	6811	6919	7026	7133	7241	7348	107
405	607455	7562	7669	7777	7884	7991	8098	8205	8312	8419	107
406	8526	8633	8740	8847	8954	9061	9167	9274	9381	9488	107
407	9594	9701	9808	9914	*0021	*0128	*0234	*0341	*0447	*0554	107
408	610660	0767	0873	0979	1086	1192	1298	1405	1511	1617	106
409	1723	1829	1936	2042	2148	2254	2360	2466	2572	2678	106
410	612784	2890	2996	3102	3207	3313	3419	3525	3630	3736	106
411	3842	3947	4053	4159	4264	4370	4475	4581	4686	4792	106
412	4897	5003	5108	5213	5319	5424	5529	5634	5740	5845	105
413	5950	6055	6160	6265	6370	6476	6581	6686	6790	6895	105
414	7000	7105	7210	7315	7420	7525	7629	7734	7839	7943	105
415	618048	8153	8257	8362	8466	8571	8676	8780	8884	8989	105
416	9093	9198	9302	9406	9511	9615	9719	9824	9928	*0032	104
417	620136	0240	0344	0448	0552	0656	0760	0864	0968	1072	104
418	1176	1280	1384	1488	1592	1695	1799	1903	2007	2110	104
419	2214	2318	2421	2525	2628	2732	2835	2939	3042	3146	104

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROP. PARTS	115	12	23	35	46	58	69	81	92	104	115
	114	11	23	34	46	57	68	80	91	103	114
	113	11	23	34	45	57	68	79	90	102	113
	112	11	22	34	45	56	67	78	90	101	112
	111	11	22	33	44	56	67	78	89	100	111
	110	11	22	33	44	55	66	77	88	99	110
	109	11	22	33	44	55	65	76	87	98	109
	108	11	22	32	43	54	65	76	86	97	108
	107	11	21	32	43	54	64	75	86	96	107
	106	11	21	32	42	53	64	74	85	95	106
	105	11	21	32	42	53	63	74	84	95	105
	104	10	21	31	42	52	62	73	83	94	104
	103	10	21	31	41	52	62	72	82	93	103
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	D
420	623249	3353	3456	3559	3663	3766	3869	3973	4076	4179	
421	4282	4385	4488	4591	4695	4798	4901	5004	5107	5210	
422	5312	5415	5518	5621	5724	5827	5929	6032	6135	6238	
423	6340	6443	6546	6648	6751	6853	6956	7058	7161	7263	
424	7366	7468	7571	7673	7775	7878	7980	8082	8185	8287	
425	628389	8491	8593	8695	8797	8900	9002	9104	9206	9308	
426	9410	9512	9613	9715	9817	9919	*0021	*0123	*0224	*0326	
427	630428	0530	0631	0733	0835	0936	1038	1139	1241	1342	
428	1444	1545	1647	1748	1849	1951	2052	2153	2255	2356	
429	2457	2559	2660	2761	2862	2963	3064	3165	3266	3367	
430	633468	3569	3670	3771	3872	3973	4074	4175	4276	4376	
431	4477	4578	4679	4779	4880	4981	5081	5182	5283	5383	
432	5484	5584	5685	5785	5886	5986	6087	6187	6287	6388	
433	6488	6588	6688	6789	6889	6989	7089	7189	7290	7390	
434	7490	7590	7690	7790	7890	7990	8090	8190	8290	8389	
435	638489	8589	8689	8789	8888	8988	9088	9188	9287	9387	
436	9486	9586	9686	9785	9885	9984	*0084	*0183	*0283	*0382	
437	640481	0581	0680	0779	0879	0978	1077	1177	1276	1375	
438	1474	1573	1672	1771	1871	1970	2069	2168	2267	2366	
439	2465	2563	2662	2761	2860	2959	3058	3156	3255	3354	
440	643453	3551	3650	3749	3847	3946	4044	4143	4242	4340	
441	4439	4537	4636	4734	4832	4931	5029	5127	5226	5324	
442	5422	5521	5619	5717	5815	5913	6011	6110	6208	6306	
443	6404	6502	6600	6698	6796	6894	6992	7089	7187	7285	
444	7383	7481	7579	7676	7774	7872	7969	8067	8165	8262	
445	648360	8458	8555	8653	8750	8848	8945	9043	9140	9237	
446	9335	9432	9530	9627	9724	9821	9919	*0016	*0113	*0210	
447	650308	0405	0502	0599	0696	0793	0890	0987	1084	*1181	
448	1278	1375	1472	1569	1666	1762	1859	1956	2053	2150	
449	2246	2343	2440	2536	2633	2730	2826	2923	3019	3116	
450	653213	3309	3405	3502	3598	3695	3791	3888	3984	4080	
451	4177	4273	4369	4465	4562	4658	4754	4850	4946	5042	
452	5138	5235	5331	5427	5523	5619	5715	5810	5906	6002	
453	6098	6194	6290	6386	6482	6577	6673	6769	6864	6960	
454	7056	7152	7247	7343	7438	7534	7629	7725	7820	7916	
455	658011	8107	8202	8298	8393	8488	8584	8679	8774	8870	
456	8965	9060	9155	9250	9346	9441	9536	9631	9726	9821	
457	9916	*0011	*0106	*0201	*0296	*0391	*0486	*0581	*0676	*0771	
458	660865	0960	1055	1150	1245	1339	1434	1529	1623	1718	
459	1813	1907	2002	2096	2191	2286	2380	2475	2569	2663	
460	662758	2852	2947	3041	3135	3230	3324	3418	3512	3607	94
461	3701	3795	3889	3983	4078	4172	4266	4360	4454	4548	94
462	4642	4736	4830	4924	5018	5112	5206	5299	5393	5487	94
463	5581	5675	5769	5862	5956	6050	6143	6237	6331	6424	94
464	6518	6612	6705	6799	6892	6986	7079	7173	7266	7360	94

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff
PROP. PARTS	104	10	21	31	42	52	62	73	83	94	104
	103	10	21	31	41	52	62	72	82	93	103
	102	10	20	31	41	51	61	71	82	92	102
	101	10	20	30	40	51	61	71	81	91	101
	100	10	20	30	40	50	60	70	80	90	100
	99	10	20	30	40	50	59	69	79	89	99
	98	10	20	29	39	49	59	69	78	88	98
	97	10	19	29	39	49	58	68	78	87	97
	96	10	19	29	38	48	58	67	77	86	96
	95	10	19	29	38	48	57	67	76	86	95
	Diff.	1	2	3	4	5	6	7	8	9	Diff

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
465	667453	7546	7640	7733	7826	7920	8013	8106	8199	8293	93
466	8386	8479	8572	8665	8759	8852	8945	9038	9131	9224	93
467	9317	9410	9503	9596	9689	9782	9875	9967	*0060	*0153	93
468	670246	0339	0431	0524	0617	0710	0802	0895	0988	1080	93
469	1173	1265	1358	1451	1543	1636	1728	1821	1913	2005	93
470	672098	2190	2283	2375	2467	2560	2652	2744	2836	2929	92
471	3021	3113	3205	3297	3390	3482	3574	3666	3758	3850	92
472	3942	4034	4126	4218	4310	4402	4494	4586	4677	4769	92
473	4861	4953	5045	5137	5228	5320	5412	5503	5595	5687	92
474	5778	5870	5962	6053	6145	6236	6328	6419	6511	6602	92
475	676694	6785	6876	6968	7059	7151	7242	7333	7424	7516	91
476	7607	7698	7789	7881	7972	8063	8154	8245	8336	8427	91
477	8518	8609	8700	8791	8882	8973	9064	9155	9246	9337	91
478	9428	9519	9610	9700	9791	9882	9973	*0063	*0154	*0245	91
479	680336	0426	0517	0607	0698	0789	0879	0970	1060	1151	91
480	681241	1332	1422	1513	1603	1693	1784	1874	1964	2055	90
481	2145	2235	2326	2416	2506	2596	2686	2777	2867	2957	90
482	3047	3137	3227	3317	3407	3497	3587	3677	3767	3857	90
483	3947	4037	4127	4217	4307	4396	4486	4576	4666	4756	90
484	4845	4935	5025	5114	5204	5294	5383	5473	5563	5652	90
485	685742	5831	5921	6010	6100	6189	6279	6368	6458	6547	89
486	6636	6726	6815	6904	6994	7083	7172	7261	7351	7440	89
487	7529	7618	7707	7796	7886	7975	8064	8153	8242	8331	89
488	8420	8509	8598	8687	8776	8865	8953	9042	9131	9220	89
489	9309	9398	9486	9575	9664	9753	9841	9930	*0019	*0107	89
490	690196	0285	0373	0462	0550	0639	0728	0816	0905	0993	89
491	1081	1170	1258	1347	1435	1524	1612	1700	1789	1877	88
492	1965	2053	2142	2230	2318	2406	2494	2583	2671	2759	88
493	2847	2935	3023	3111	3199	3287	3375	3463	3551	3639	88
494	3727	3815	3903	3991	4078	4166	4254	4342	4430	4517	88
495	694605	4693	4781	4868	4956	5044	5131	5219	5307	5394	88
496	5482	5569	5657	5744	5832	5919	6007	6094	6182	6269	87
497	6356	6444	6531	6618	6706	6793	6880	6968	7055	7142	87
498	7229	7317	7404	7491	7578	7665	7752	7839	7926	8014	87
499	8101	8188	8275	8362	8449	8535	8622	8709	8796	8883	87
500	698970	9057	9144	9231	9317	9404	9491	9578	9664	9751	87
501	9838	9924	*0011	*0098	*0184	*0271	*0358	*0444	*0531	*0617	87
502	700704	0790	0877	0963	1050	1136	1222	1309	1395	1482	86
503	1568	1654	1741	1827	1913	1999	2086	2172	2258	2344	86
504	2431	2517	2603	2689	2775	2861	2947	3033	3119	3205	86
505	703291	3377	3463	3549	3635	3721	3807	3893	3979	4065	86
506	4151	4236	4322	4408	4494	4579	4665	4751	4837	4922	86
507	5008	5094	5179	5265	5350	5436	5522	5607	5693	5778	86
508	5864	5949	6035	6120	6206	6291	6376	6462	6547	6632	85
509	6718	6803	6888	6974	7059	7144	7229	7315	7400	7485	85

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROP. PARTS	94	9	19	28	38	47	56	66	75	85	94
	93	9	19	28	37	47	56	65	74	84	93
	92	9	18	28	37	46	55	64	74	83	92
	91	9	18	27	36	46	55	64	73	82	91
	90	9	18	27	36	45	54	63	72	81	90
	89	9	18	27	36	45	53	62	71	80	89
	88	9	18	26	35	44	53	62	70	79	88
	87	9	17	26	35	44	52	61	70	78	87
	86	9	17	26	34	43	52	60	69	77	86
	85	9	17	26	34	43	51	60	68	77	85
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

N.	0	1	2	3	4	5	6	7	8	9	Di
510	707570	7655	7740	7826	7911	7996	8081	8166	8251	8336	8
511	8421	8506	8591	8676	8761	8846	8931	9015	9100	9185	8
512	9270	9355	9440	9524	9609	9694	9779	9863	9948	*0033	8
513	710117	0202	0287	0371	0456	0540	0625	0710	0794	0879	8
514	0963	1048	1132	1217	1301	1385	1470	1554	1639	1723	8
515	711807	1892	1976	2060	2144	2229	2313	2397	2481	2566	8
516	2650	2734	2818	2902	2986	3070	3154	3238	3323	3407	8
517	3491	3575	3659	3742	3826	3910	3994	4078	4162	4246	8
518	4330	4414	4497	4581	4665	4749	4833	4916	5000	5084	8
519	5167	5251	5335	5418	5502	5586	5669	5753	5836	5920	8
520	716003	6087	6170	6254	6337	6421	6504	6588	6671	6754	8
521	6838	6921	7004	7088	7171	7254	7338	7421	7504	7587	8
522	7671	7754	7837	7920	8003	8086	8169	8253	8336	8419	8
523	8502	8585	8668	8751	8834	8917	9000	9083	9165	9248	8
524	9331	9414	9497	9580	9663	9745	9828	9911	9994	*0077	8
525	720159	0242	0325	0407	0490	0573	0655	0738	0821	0903	8
526	0986	1068	1151	1233	1316	1398	1481	1563	1646	1728	8
527	1811	1893	1975	2058	2140	2222	2305	2387	2469	2552	8
528	2634	2716	2798	2881	2963	3045	3127	3209	3291	3374	8
529	3456	3538	3620	3702	3784	3866	3948	4030	4112	4194	82
530	724276	4358	4440	4522	4604	4685	4767	4849	4931	5013	82
531	5095	5176	5258	5340	5422	5503	5585	5667	5748	5830	82
532	5912	5993	6075	6156	6238	6320	6401	6483	6564	6646	82
533	6727	6809	6890	6972	7053	7134	7216	7297	7379	7460	81
534	7541	7623	7704	7785	7866	7948	8029	8110	8191	8273	81
535	728354	8435	8516	8597	8678	8759	8841	8922	9003	9084	81
536	9165	9246	9327	9408	9489	9570	9651	9732	9813	9893	81
537	9974	*0055	*0136	*0217	*0298	*0378	*0459	*0540	*0621	*0702	81
538	730782	0863	0944	1024	1105	1186	1266	1347	1428	1508	81
539	1589	1669	1750	1830	1911	1991	2072	2152	2233	2313	81
540	732394	2474	2555	2635	2715	2796	2876	2956	3037	3117	80
541	3197	3278	3358	3438	3518	3598	3679	3759	3839	3919	80
542	3999	4079	4160	4240	4320	4400	4480	4560	4640	4720	80
543	4800	4880	4960	5040	5120	5200	5279	5359	5439	5519	80
544	5599	5679	5759	5838	5918	5998	6078	6157	6237	6317	80
545	736397	6476	6556	6635	6715	6795	6874	6954	7034	7113	80
546	7193	7272	7352	7431	7511	7590	7670	7749	7829	7908	79
547	7987	8067	8146	8225	8305	8384	8463	8543	8622	8701	79
548	8781	8860	8939	9018	9097	9177	9256	9335	9414	9493	79
549	9572	9651	9731	9810	9889	9968	*0047	*0126	*0205	*0284	79
550	740363	0442	0521	0600	0678	0757	0836	0915	0994	1073	79
551	1152	1230	1309	1388	1467	1546	1624	1703	1782	1860	79
552	1939	2018	2096	2175	2254	2332	2411	2489	2568	2647	79
553	2725	2804	2882	2961	3039	3118	3196	3275	3353	3431	78
554	3510	3588	3667	3745	3823	3902	3980	4058	4136	4215	78

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PROP. PARTS	86	9	17	26	34	43	52	60	69	77	86
	85	9	17	26	34	43	51	60	68	77	85
	84	8	17	25	34	42	50	59	67	76	84
	83	8	17	25	33	42	50	58	66	75	83
	82	8	16	25	33	41	49	57	66	74	82
	81	8	16	24	32	41	49	57	65	73	81
	80	8	16	24	32	40	48	56	64	72	80
	79	8	16	24	32	40	47	55	63	71	79
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Dif
555	744293	4371	4449	4528	4606	4684	4762	4840	4919	4997	78
556	5075	5153	5231	5309	5387	5465	5543	5621	5699	5777	78
557	5855	5933	6011	6089	6167	6245	6323	6401	6479	6556	78
558	6634	6712	6790	6868	6945	7023	7101	7179	7256	7334	78
559	7412	7489	7567	7645	7722	7800	7878	7955	8033	8110	78
560	748188	8266	8343	8421	8498	8576	8653	8731	8808	8885	77
561	8963	9040	9118	9195	9272	9350	9427	9504	9582	9659	77
562	9736	9814	9891	9968	*0045	*0123	*0200	*0277	*0354	*0431	77
563	750508	0586	0663	0740	0817	0894	0971	1048	1125	1202	77
564	1279	1356	1433	1510	1587	1664	1741	1818	1895	1972	77
565	752048	2125	2202	2279	2356	2433	2509	2586	2663	2740	77
566	2816	2893	2970	3047	3123	3200	3277	3353	3430	3506	77
567	3583	3660	3736	3813	3889	3966	4042	4119	4195	4272	77
568	4348	4425	4501	4578	4654	4730	4807	4883	4960	5036	76
569	5112	5189	5265	5341	5417	5494	5570	5646	5722	5799	76
570	755875	5951	6027	6103	6180	6256	6332	6408	6484	6560	76
571	6636	6712	6788	6864	6940	7016	7092	7168	7244	7320	76
572	7396	7472	7548	7624	7700	7775	7851	7927	8003	8079	76
573	8155	8230	8306	8382	8458	8533	8609	8685	8761	8836	76
574	8912	8988	9063	9139	9214	9290	9366	9441	9517	9592	76
575	759668	9743	9819	9894	9970	*0045	*0121	*0196	*0272	*0347	75
576	760422	0498	0573	0649	0724	0799	0875	0950	1025	1101	75
577	1176	1251	1326	1402	1477	1552	1627	1702	1778	1853	75
578	1928	2003	2078	2153	2228	2303	2378	2453	2529	2604	75
579	2679	2754	2829	2904	2978	3053	3128	3203	3278	3353	75
580	763428	3503	3578	3653	3727	3802	3877	3952	4027	4101	75
581	4176	4251	4326	4400	4475	4550	4624	4699	4774	4848	75
582	4923	4998	5072	5147	5221	5296	5370	5445	5520	5594	75
583	5669	5743	5818	5892	5966	6041	6115	6190	6264	6338	74
584	6413	6487	6562	6636	6710	6785	6859	6933	7007	7082	74
585	767156	7230	7304	7379	7453	7527	7601	7675	7749	7823	74
586	7898	7972	8046	8120	8194	8268	8342	8416	8490	8564	74
587	8638	8712	8786	8860	8934	9008	9082	9156	9230	9303	74
588	9377	9451	9525	9599	9673	9746	9820	9894	9968	*0042	74
589	770115	0189	0263	0336	0410	9484	0557	0631	0705	0778	74
590	770852	0926	0999	1073	1146	1220	1293	1367	1440	1514	74
591	1587	1661	1734	1808	1881	1955	2028	2102	2175	2248	73
592	2322	2395	2468	2542	2615	2688	2762	2835	2908	2981	73
593	3055	3128	3201	3274	3348	3421	3494	3567	3640	3713	73
594	3786	3860	3933	4006	4079	4152	4225	4298	4371	4444	73
595	774517	4590	4663	4736	4809	4882	4955	5028	5100	5173	73
596	5246	5319	5392	5465	5538	5610	5683	5756	5829	5902	73
597	5974	6047	6120	6193	6265	6338	6411	6483	6556	6629	73
598	6701	6774	6846	6919	6992	7064	7137	7209	7282	7354	73
599	7427	7499	7572	7644	7717	7789	7862	7934	8006	8079	72

N.	Diff.	1	2	3	4	5	6	7	8	9	Dif
PRO. PARTS	78	8	16	23	31	39	47	55	62	70	78
	77	8	15	23	31	39	46	54	62	69	77
	76	8	15	23	30	38	46	53	61	68	76
	75	8	15	23	30	38	45	53	60	68	75
	74	7	15	22	30	37	44	52	59	67	74
	73	7	15	22	29	37	44	51	58	66	73
	72	7	14	22	29	36	43	50	58	65	72
	Diff.	1	2	3	4	5	6	7	8	9	Dif

N.	0	1	2	3	4	5	6	7	8	9	Diff.
600	778151	8224	8296	8368	8441	8513	8585	8658	8730	8802	72
601	8874	8947	9019	9091	9163	9236	9308	9380	9452	9524	72
602	9596	9669	9741	9813	9885	9957	*0029	*0101	*0173	*0245	72
603	780317	0389	0461	0533	0605	0677	0749	0821	0893	0965	72
604	1037	1109	1181	1253	1324	1396	1468	1540	1612	1684	72
605	781755	1827	1899	1971	2042	2114	2186	2258	2329	2401	72
606	2473	2544	2616	2688	2759	2831	2902	2974	3046	3117	72
607	3189	3260	3332	3403	3475	3546	3618	3689	3761	3832	71
608	3904	3975	4046	4118	4189	4261	4332	4403	4475	4546	71
609	4617	4689	4760	4831	4902	4974	5045	5116	5187	5259	71
610	785330	5401	5472	5543	5615	5686	5757	5828	5899	5970	71
611	6041	6112	6183	6254	6325	6396	6467	6538	6609	6680	71
612	6751	6822	6893	6964	7035	7106	7177	7248	7319	7390	71
613	7460	7531	7602	7673	7744	7815	7885	7956	8027	8098	71
614	8168	8239	8310	8381	8451	8522	8593	8663	8734	8804	71
615	788875	8946	9016	9087	9157	9228	9299	9369	9440	9510	71
616	9581	9651	9722	9792	9863	9933	*0004	*0074	*0144	*0215	70
617	790285	0356	0426	0496	0567	0637	0707	0778	0848	0918	70
618	0988	1059	1129	1199	1269	1340	1410	1480	1550	1620	70
619	1691	1761	1831	1901	1971	2041	2111	2181	2252	2322	70
620	792392	2462	2532	2602	2672	2742	2812	2882	2952	3022	70
621	3092	3162	3231	3301	3371	3441	3511	3581	3651	3721	70
622	3790	3860	3930	4000	4070	4139	4209	4279	4349	4418	70
623	4488	4558	4627	4697	4767	4836	4906	4976	5045	5115	70
624	5185	5254	5324	5393	5463	5532	5602	5672	5741	5811	70
625	795880	5949	6019	6088	6158	6227	6297	6366	6436	6505	69
626	6574	6644	6713	6782	6852	6921	6990	7060	7129	7198	69
627	7268	7337	7406	7475	7545	7614	7683	7752	7821	7890	69
628	7960	8029	8098	8167	8236	8305	8374	8443	8513	8582	69
629	8651	8720	8789	8858	8927	8996	9065	9134	9203	9272	69
630	799341	9409	9478	9547	9616	9685	9754	9823	9892	9961	69
631	8000[illegible]	0098	0167	0236	0305	0373	0442	0511	0580	0648	69
632	0717	0786	0854	0923	0992	1061	1129	1198	1266	1335	69
633	1404	1472	1541	1609	1678	1747	1815	1884	1952	2021	69
634	2089	2158	2226	2295	2363	2432	2500	2568	2637	2705	68
635	802774	2842	2910	2979	3047	3116	3184	3252	3321	3389	68
636	3457	3525	3594	3662	3730	3798	3867	3935	4003	4071	68
637	4139	4208	4276	4344	4412	4480	4548	4616	4685	4753	68
638	4821	4889	4957	5025	5093	5161	5229	5297	5365	5433	68
639	5501	5569	5637	5705	5773	5841	5908	5976	6044	6112	68
640	806180	6248	6316	6384	6451	6519	6587	6655	6723	6790	68
641	6858	6926	6994	7061	7129	7197	7264	7332	7400	7467	68
642	7535	7603	7670	7738	7806	7873	7941	8008	8076	8143	68
643	8211	8279	8346	8414	8481	8549	8616	8684	8751	8818	67
644	8886	8953	9021	9088	9156	9223	9290	9358	9425	9492	67
645	809560	9627	9694	9762	9829	9896	9964	*0031	*0098	*0165	67
646	810233	0300	0367	0434	0501	0569	0636	0703	0770	0837	67
47	0904	0971	1039	1106	1173	1240	1307	1374	1441	1508	67
48	1575	1642	1709	1776	1843	1910	1977	2044	2111	2178	67
49	2245	2312	2379	2445	2512	2579	2646	2713	2780	2847	67
N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
	73	7	15	22	29	37	44	51	58	66	73
	72	7	14	22	29	36	43	50	58	65	72
	71	7	14	21	28	36	43	50	57	64	71
	70	7	14	21	28	35	42	49	56	63	70
	69	7	14	21	28	35	41	48	55	62	69
	68	7	14	20	27	34	41	48	54	61	68
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

1.778
2.21

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
650	812913	2980	3047	3114	3181	3247	3314	3381	3448	3514	67
651	3581	3648	3714	3781	3848	3914	3981	4048	4114	4181	67
652	4248	4314	4381	4447	4514	4581	4647	4714	4780	4847	67
653	4913	4980	5046	5113	5179	5246	5312	5378	5445	5511	66
654	5578	5644	5711	5777	5843	5910	5976	6042	6109	6175	66
655	816241	6308	6374	6440	6506	6573	6639	6705	6771	6838	66
656	6904	6970	7036	7102	7169	7235	7301	7367	7433	7499	66
657	7565	7631	7698	7764	7830	7896	7962	8028	8094	8160	66
658	8226	8292	8358	8424	8490	8556	8622	8688	8754	8820	66
659	8885	8951	9017	9083	9149	9215	9281	9346	9412	9478	66
660	819544	9610	9676	9741	9807	9873	9939	*0004	*0070	*0136	66
661	820201	0267	0333	0399	0464	0530	0595	0661	0727	0792	66
662	0858	0924	0989	1055	1120	1186	1251	1317	1382	1448	66
663	1514	1579	1645	1710	1775	1841	1906	1972	2037	2103	65
664	2168	2233	2299	2364	2430	2495	2560	2626	2691	2756	65
665	822822	2887	2952	3018	3083	3148	3213	3279	3344	3409	65
666	3474	3539	3605	3670	3735	3800	3865	3930	3996	4061	65
667	4126	4191	4256	4321	4386	4451	4516	4581	4646	4711	65
668	4776	4841	4906	4971	5036	5101	5166	5231	5296	5361	65
669	5426	5491	5556	5621	5686	5751	5815	5880	5945	6010	65
670	826075	6140	6204	6269	6334	6399	6464	6528	6593	6658	65
671	6723	6787	6852	6917	6981	7046	7111	7175	7240	7305	65
672	7369	7434	7499	7563	7628	7692	7757	7821	7886	7951	65
673	8015	8080	8144	8209	8273	8338	8402	8467	8531	8595	64
674	8660	8724	8789	8853	8918	8982	9046	9111	9175	9239	64
675	829304	9368	9432	9497	9561	9625	9690	9754	9818	9882	64
676	9947	*0011	*0075	*0139	*0204	*0268	*0332	*0396	*0460	*0525	64
677	830589	0653	0717	0781	0845	0909	0973	1037	1102	1166	64
678	1230	1294	1358	1422	1486	1550	1614	1678	1742	1806	64
679	1870	1934	1998	2062	2126	2189	2253	2317	2381	2445	64
680	832509	2573	2637	2700	2764	2828	2892	2956	3020	3[illegible]83	64
681	3147	3211	3275	3338	3402	3466	3530	3593	3657	3721	64
682	3784	3848	3912	3975	4039	4103	4166	4230	4294	4357	64
683	4421	4484	4548	4611	4675	4739	4802	4866	4929	4993	64
684	5056	5120	5183	5247	5310	5373	5437	5500	5564	5627	63
685	835691	5754	5817	5881	5944	6007	6071	6134	6197	6261	63
686	6324	6387	6451	6514	6577	6641	6704	6767	6830	6894	63
687	6957	7020	7083	7146	7210	7273	7336	7399	7462	7525	63
688	7588	7652	7715	7778	7841	7904	7967	8030	8093	8156	63
689	8219	8282	8345	8408	8471	8534	8597	8660	8723	8786	63
690	838849	8912	8975	9038	9101	9164	9227	9289	9352	9415	63
691	9478	9541	9604	9667	9729	9792	9855	9918	9981	*0043	63
692	840106	0169	0232	0294	0357	0420	0482	0545	0608	0671	63
693	0733	0796	0859	0921	0984	1046	1109	1172	1234	1297	63
694	1359	1422	1485	1547	1610	1672	1735	1797	1860	1922	63
695	841985	2047	2110	2172	2235	2297	2360	2422	2484	2547	62
696	2609	2672	2734	2796	2859	2921	2983	3046	3108	3170	62
697	3233	3295	3357	3420	3482	3544	3606	3669	3731	3793	62
698	3855	3918	3980	4042	4104	4166	4229	4291	4353	4415	62
699	4477	4539	4601	4664	4726	4788	4850	4912	4974	5036	62

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PRO. P'TS	67	7	13	20	27	34	40	47	54	60	67
	66	7	13	20	26	33	40	46	53	59	66
	65	7	13	20	26	33	39	46	52	59	65
	64	6	13	19	26	32	38	45	51	58	64
	63	6	13	19	25	32	38	44	50	57	63
	62	6	12	19	25	31	37	43	50	56	62
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
700	845098	5160	5222	5284	5346	5408	5470	5532	5594	5656	62
701	5718	5780	5842	5904	5966	6028	6090	6151	6213	6275	62
702	6337	6399	6461	6523	6585	6646	6708	6770	6832	6894	62
703	6955	7017	7079	7141	7202	7264	7326	7388	7449	7511	62
704	7573	7634	7696	7758	7819	7881	7943	8004	8066	8128	62
705	848189	8251	8312	8374	8435	8497	8559	8620	8682	8743	62
706	8805	8866	8928	8989	9051	9112	9174	9235	9297	9358	61
707	9419	9481	9542	9604	9665	9726	9788	9849	9911	9972	61
708	850033	0095	0156	0217	0279	0340	0401	0462	0524	0585	61
709	0646	0707	0769	0830	0891	0952	1014	1075	1136	1197	61
710	851258	1320	1381	1442	1503	1564	1625	1686	1747	1809	61
711	1870	1931	1992	2053	2114	2175	2236	2297	2358	2419	61
712	2480	2541	2602	2663	2724	2785	2846	2907	2968	3029	61
713	3090	3150	3211	3272	3333	3394	3455	3516	3577	3637	61
714	3698	3759	3820	3881	3941	4002	4063	4124	4185	4245	61
715	854306	4367	4428	4488	4549	4610	4670	4731	4792	4852	61
716	4913	4974	5034	5095	5156	5216	5277	5337	5398	5459	61
717	5519	5580	5640	5701	5761	5822	5882	5943	6003	6064	61
718	6124	6185	6245	6306	6366	6427	6487	6548	6608	6668	60
719	6729	6789	6850	6910	6970	7031	7091	7152	7212	7272	60
720	857332	7393	7453	7513	7574	7634	7694	7755	7815	7875	60
721	7935	7995	8056	8116	8176	8236	8297	8357	8417	8477	60
722	8537	8597	8657	8718	8778	8838	8898	8958	9018	9078	60
723	9138	9198	9258	9318	9379	9439	9499	9559	9619	9679	60
724	9739	9799	9859	9918	9978	*0038	*0098	*0158	*0218	*0278	60
725	860338	0398	0458	0518	0578	0637	0697	0757	0817	0877	60
726	0937	0996	1056	1116	1176	1236	1295	1355	1415	1475	60
727	1534	1594	1654	1714	1773	1833	1893	1952	2012	2072	60
728	2131	2191	2251	2310	2370	2430	2489	2549	2608	2668	60
729	2728	2787	2847	2906	2966	3025	3085	3144	3204	3263	60
730	863323	3382	3442	3501	3561	3620	3680	3739	3799	3858	59
731	3917	3977	4036	4096	4155	4214	4274	4333	4392	4452	59
732	4511	4570	4630	4689	4748	4808	4867	4926	4985	5045	59
733	5104	5163	5222	5282	5341	5400	5459	5519	5578	5637	59
734	5696	5755	5814	5874	5933	5992	6051	6110	6169	6228	59
735	866287	6346	6405	6465	6524	6583	6642	6701	6760	6819	59
736	6878	6937	6996	7055	7114	7173	7232	7291	7350	7409	59
737	7467	7526	7585	7644	7703	7762	7821	7880	7939	7998	59
738	8056	8115	8174	8233	8292	8350	8409	8468	8527	8586	59
739	8644	8703	8762	8821	8879	8938	8997	9056	9114	9173	59
740	869232	9290	9349	9408	9466	9525	9584	9642	9701	9760	59
741	9818	9877	9935	9994	*0053	*0111	*0170	*0228	*0287	*0345	59
742	870404	0462	0521	0579	0638	0696	0755	0813	0872	0930	58
743	0989	1047	1106	1164	1223	1281	1339	1398	1456	1515	58
744	1573	1631	1690	1748	1806	1865	1923	1981	2040	2098	58
745	872156	2215	2273	2331	2389	2448	2506	2564	2622	2681	58
746	2739	2797	2855	2913	2972	3030	3088	3146	3204	3262	58
747	3321	3379	3437	3495	3553	3611	3669	3727	3785	3844	58
748	3902	3960	4018	4076	4134	4192	4250	4308	4366	4424	58
749	4482	4540	4598	4656	4714	4772	4830	4888	4945	5003	58

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PRO. P'TS	62	6	12	19	25	31	37	43	50	56	62
	61	6	12	18	24	31	37	43	49	55	61
	60	6	12	18	24	30	36	42	48	54	60
	59	6	12	18	24	30	35	41	47	53	59
	58	6	12	17	23	29	35	41	46	52	58
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
750	875061	5119	5177	5235	5293	5351	5409	5466	5524	5582	58
751	5640	5698	5756	5813	5871	5929	5987	6045	6102	6160	58
752	6218	6276	6333	6391	6449	6507	6564	6622	6680	6737	58
753	6795	6853	6910	6968	7026	7083	7141	7199	7256	7314	58
754	7371	7429	7487	7544	7602	7659	7717	7774	7832	7889	58
755	877947	8004	8062	8119	8177	8234	8292	8349	8407	8464	57
756	8522	8579	8637	8694	8752	8809	8866	8924	8981	9039	57
757	9096	9153	9211	9268	9325	9383	9440	9497	9555	9612	57
758	9669	9726	9784	9841	9898	9956	*0013	*0070	*0127	*0185	57
759	880242	0299	0356	0413	0471	0528	0585	0642	0699	0756	57
760	880814	0871	0928	0985	1042	1099	1156	1213	1271	1328	57
761	1385	1442	1499	1556	1613	1670	1727	1784	1841	1898	57
762	1955	2012	2069	2126	2183	2240	2297	2354	2411	2468	57
763	2525	2581	2638	2695	2752	2809	2866	2923	2980	3037	57
764	3093	3150	3207	3264	3321	3377	3434	3491	3548	3605	57
765	883661	3718	3775	3832	3888	3945	4002	4059	4115	4172	57
766	4229	4285	4342	4399	4455	4512	4569	4625	4682	4739	57
767	4795	4852	4909	4965	5022	5078	5135	5192	5248	5305	57
768	5361	5418	5474	5531	5587	5644	5700	5757	5813	5870	57
769	5926	5983	6039	6096	6152	6209	6265	6321	6378	6434	56
770	886491	6547	6604	6660	6716	6773	6829	6885	6942	6998	56
771	7054	7111	7167	7223	7280	7336	7392	7449	7505	7561	56
772	7617	7674	7730	7786	7842	7898	7955	8011	8067	8123	56
773	8179	8236	8292	8348	8404	8460	8516	8573	8629	8685	56
774	8741	8797	8853	8909	8965	9021	9077	9134	9190	9246	56
775	889302	9358	9414	9470	9526	9582	9638	9694	9750	9806	56
776	9862	9918	9974	*0030	*0086	*0141	*0197	*0253	*0309	*0365	56
777	890421	0477	0533	0589	0645	0700	0756	0812	0868	0924	56
778	0980	1035	1091	1147	1203	1259	1314	1370	1426	1482	56
779	1537	1593	1649	1705	1760	1816	1872	1928	1983	2039	56
780	892095	2150	2206	2262	2317	2373	2429	2484	2540	2595	56
781	2651	2707	2762	2818	2873	2929	2985	3040	3096	3151	56
782	3207	3262	3318	3373	3429	3484	3540	3595	3651	3706	56
783	3762	3817	3873	3928	3984	4039	4094	4150	4205	4261	55
784	4316	4371	4427	4482	4538	4593	4648	4704	4759	4814	55
785	894870	4925	4980	5036	5091	5146	5201	5257	5312	5367	55
786	5423	5478	5533	5588	5644	5699	5754	5809	5864	5920	55
787	5975	6030	6085	6140	6195	6251	6306	6361	6416	6471	55
788	6526	6581	6636	6692	6747	6802	6857	6912	6967	7022	55
789	7077	7132	7187	7242	7297	7352	7407	7462	7517	7572	55
790	897627	7682	7737	7792	7847	7902	7957	8012	8067	8122	55
791	8176	8231	8286	8341	8396	8451	8506	8561	8615	8670	55
792	8725	8780	8835	8890	8944	8999	9054	9109	9164	9218	55
793	9273	9328	9383	9437	9492	9547	9602	9656	9711	9766	55
794	9821	9875	9930	9985	*0039	*0094	*0149	*0203	*0258	*0312	55
795	900367	0422	0476	0531	0586	0640	0695	0749	0804	0859	55
796	0913	0968	1022	1077	1131	1186	1240	1295	1349	1404	55
797	1458	1513	1567	1622	1676	1731	1785	1840	1894	1948	54
798	2003	2057	2112	2166	2221	2275	2329	2384	2438	2492	54
799	2547	2601	2655	2710	2764	2818	2873	2927	2981	3036	54

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR. PTS.	57	6	11	17	23	29	34	40	46	51	57
	56	6	11	17	22	28	34	39	45	50	56
	55	6	11	17	22	28	33	39	44	50	55
	54	5	11	16	22	27	32	38	43	49	54
.	Diff.	1	2	3	4	5	6	7	8	9	Diff.

8521

1.715

N.	0	1	2	3	4	5	6	7	8	9	Diff
700	845098	5160	5222	5284	5346	5408	5470	5532	5594	5656	62
701	5718	5780	5842	5904	5966	6028	6090	6151	6213	6275	62
702	6337	6399	6461	6523	6585	6646	6708	6770	6832	6894	62
703	6955	7017	7079	7141	7202	7264	7326	7388	7449	7511	62
704	7573	7634	7696	7758	7819	7881	7943	8004	8066	8128	62
705	848189	8251	8312	8374	8435	8497	8559	8620	8682	8743	62
706	8805	8866	8928	8989	9051	9112	9174	9235	9297	9358	61
707	9419	9481	9542	9604	9665	9726	9788	9849	9911	9972	61
708	850033	0095	0156	0217	0279	0340	0401	0462	0524	0585	61
709	0646	0707	0769	0830	0891	0952	1014	1075	1136	1197	61
710	851258	1320	1381	1442	1503	1564	1625	1686	1747	1809	61
711	1870	1931	1992	2053	2114	2175	2236	2297	2358	2419	61
712	2480	2541	2602	2663	2724	2785	2846	2907	2968	3029	61
713	3090	3150	3211	3272	3333	3394	3455	3516	3577	3637	61
714	3698	3759	3820	3881	3941	4002	4063	4124	4185	4245	61
715	854306	4367	4428	4488	4549	4610	4670	4731	4792	4852	61
716	4913	4974	5034	5095	5156	5216	5277	5337	5398	5459	61
717	5519	5580	5640	5701	5761	5822	5882	5943	6003	6064	61
718	6124	6185	6245	6306	6366	6427	6487	6548	6608	6668	60
719	6729	6789	6850	6910	6970	7031	7091	7152	7212	7272	60
720	857332	7393	7453	7513	7574	7634	7694	7755	7815	7875	60
721	7935	7995	8056	8116	8176	8236	8297	8357	8417	8477	60
722	8537	8597	8657	8718	8778	8838	8898	8958	9018	9078	60
723	9138	9198	9258	9318	9379	9439	9499	9559	9619	9679	60
724	9739	9799	9859	9918	9978	*0038	*0098	*0158	*0218	*0278	60
725	860338	0398	0458	0518	0578	0637	0697	0757	0817	0877	60
726	0937	0996	1056	1116	1176	1236	1295	1355	1415	1475	60
727	1534	1594	1654	1714	1773	1833	1893	1952	2012	2072	60
728	2131	2191	2251	2310	2370	2430	2489	2549	2608	2668	60
729	2728	2787	2847	2906	2966	3025	3085	3144	3204	3263	60
730	863323	3382	3442	3501	3561	3620	3680	3739	3799	3858	59
731	3917	3977	4036	4096	4155	4214	4274	4333	4392	4452	59
732	4511	4570	4630	4689	4748	4808	4867	4926	4985	5045	59
733	5104	5163	5222	5282	5341	5400	5459	5519	5578	5637	59
734	5696	5755	5814	5874	5933	5992	6051	6110	6169	6228	59
735	866287	6346	6405	6465	6524	6583	6642	6701	6760	6819	59
736	6878	6937	6996	7055	7114	7173	7232	7291	7350	7409	59
737	7467	7526	7585	7644	7703	7762	7821	7880	7939	7998	59
738	8056	8115	8174	8233	8292	8350	8409	8468	8527	8586	59
739	8644	8703	8762	8821	8879	8938	8997	9056	9114	9173	59
740	869232	9290	9349	9408	9466	9525	9584	9642	9701	9760	59
741	9818	9877	9935	9994	*0053	*0111	*0170	*0228	*0287	*0345	59
742	870404	0462	0521	0579	0638	0696	0755	0813	0872	0930	58
743	0989	1047	1106	1164	1223	1281	1339	1398	1456	1515	58
744	1573	1631	1690	1748	1806	1865	1923	1981	2040	2098	58
745	872156	2215	2273	2331	2389	2448	2506	2564	2622	2681	58
746	2739	2797	2855	2913	2972	3030	3088	3146	3204	3262	58
747	3321	3379	3437	3495	3553	3611	3669	3727	3785	3844	58
748	3902	3960	4018	4076	4134	4192	4250	4308	4366	4424	58
749	4482	4540	4598	4656	4714	4772	4830	4888	4945	5003	58

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff
PRO. P'TS	62	6	12	19	25	31	37	43	50	56	62
	61	6	12	18	24	31	37	43	49	55	61
	60	6	12	18	24	30	36	42	48	54	60
	59	6	12	18	24	30	35	41	47	53	59
	58	6	12	17	23	29	35	41	46	52	58
	Diff.	1	2	3	4	5	6	7	8	9	Diff

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
750	875061	5119	5177	5235	5293	5351	5409	5466	5524	5582	58
751	5640	5698	5756	5813	5871	5929	5987	6045	6102	6160	58
752	6218	6276	6333	6391	6449	6507	6564	6622	6680	6737	58
753	6795	6853	6910	6968	7026	7083	7141	7199	7256	7314	58
754	7371	7429	7487	7544	7602	7659	7717	7774	7832	7889	58
755	877947	8004	8062	8119	8177	8234	8292	8349	8407	8464	57
756	8522	8579	8637	8694	8752	8809	8866	8924	8981	9039	57
757	9096	9153	9211	9268	9325	9383	9440	9497	9555	9612	57
758	9669	9726	9784	9841	9898	9956	*0013	*0070	*0127	*0185	57
759	880242	0299	0356	0413	0471	0528	0585	0642	0699	0756	57
760	880814	0871	0928	0985	1042	1099	1156	1213	1271	1328	57
761	1385	1442	1499	1556	1613	1670	1727	1784	1841	1898	57
762	1955	2012	2069	2126	2183	2240	2297	2354	2411	2468	57
763	2525	2581	2638	2695	2752	2809	2866	2923	2980	3037	57
764	3093	3150	3207	3264	3321	3377	3434	3491	3548	3605	57
765	883661	3718	3775	3832	3888	3945	4002	4059	4115	4172	57
766	4229	4285	4342	4399	4455	4512	4569	4625	4682	4739	57
767	4795	4852	4909	4965	5022	5078	5135	5192	5248	5305	57
768	5361	5418	5474	5531	5587	5644	5700	5757	5813	5870	57
769	5926	5983	6039	6096	6152	6209	6265	6321	6378	6434	56
770	886491	6547	6604	6660	6716	6773	6829	6885	6942	6998	56
771	7054	7111	7167	7223	7280	7336	7392	7449	7505	7561	56
772	7617	7674	7730	7786	7842	7898	7955	8011	8067	8123	56
773	8179	8236	8292	8348	8404	8460	8516	8573	8629	8685	56
774	8741	8797	8853	8909	8965	9021	9077	9134	9190	9246	56
775	889302	9358	9414	9470	9526	9582	9638	9694	9750	9806	56
776	9862	9918	9974	*0030	*0086	*0141	*0197	*0253	*0309	*0365	56
777	890421	0477	0533	0589	0645	0700	0756	0812	0868	0924	56
778	0980	1035	1091	1147	1203	1259	1314	1370	1426	1482	56
779	1537	1593	1649	1705	1760	1816	1872	1928	1983	2039	56
780	892095	2150	2206	2262	2317	2373	2429	2484	2540	2595	56
781	2651	2707	2762	2818	2873	2929	2985	3040	3096	3151	56
782	3207	3262	3318	3373	3429	3484	3540	3595	3651	3706	56
783	3762	3817	3873	3928	3984	4039	4094	4150	4205	4261	55
784	4316	4371	4427	4482	4538	4593	4648	4704	4759	4814	55
785	894870	4925	4980	5036	5091	5146	5201	5257	5312	5367	55
786	5423	5478	5533	5588	5644	5699	5754	5809	5864	5920	55
787	5975	6030	6085	6140	6195	6251	6306	6361	6416	6471	55
788	6526	6581	6636	6692	6747	6802	6857	6912	6967	7022	55
789	7077	7132	7187	7242	7297	7352	7407	7462	7517	7572	55
790	897627	7682	7737	7792	7847	7902	7957	8012	8067	8122	55
791	8176	8231	8286	8341	8396	8451	8506	8561	8615	8670	55
792	8725	8780	8835	8890	8944	8999	9054	9109	9164	9218	55
793	9273	9328	9383	9437	9492	9547	9602	9656	9711	9766	55
794	9821	9875	9930	9985	*0039	*0094	*0149	*0203	*0258	*0312	55
795	900367	0422	0476	0531	0586	0640	0695	0749	0804	0859	55
796	0913	0968	1022	1077	1131	1186	1240	1295	1349	1404	55
797	1458	1513	1567	1622	1676	1731	1785	1840	1894	1948	54
798	2003	2057	2112	2166	2221	2275	2329	2384	2438	2492	54
799	2547	2601	2655	2710	2764	2818	2873	2927	2981	3036	54

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR. PTS.	57	6	11	17	23	29	34	40	46	51	57
	56	6	11	17	22	28	34	39	45	50	56
	55	6	11	17	22	28	33	39	44	50	55
	54	5	11	16	22	27	32	38	43	49	54
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

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1.715

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
800	903090	3144	3199	3253	3307	3361	3416	3470	3524	3578	54
801	3633	3687	3741	3795	3849	3904	3958	4012	4066	4120	54
802	4174	4229	4283	4337	4391	4445	4499	4553	4607	4661	54
803	4716	4770	4824	4878	4932	4986	5040	5094	5148	5202	54
804	5256	5310	5364	5418	5472	5526	5580	5634	5688	5742	54
805	905796	5850	5904	5958	6012	6066	6119	6173	6227	6281	54
806	6335	6389	6443	6497	6551	6604	6658	6712	6766	6820	54
807	6874	6927	6981	7035	7089	7143	7196	7250	7304	7358	54
808	7411	7465	7519	7573	7626	7680	7734	7787	7841	7895	54
809	7949	8002	8056	8110	8163	8217	8270	8324	8378	8431	54
810	908485	8539	8592	8646	8699	8753	8807	8860	8914	8967	54
811	9021	9074	9128	9181	9235	9289	9342	9396	9449	9503	54
812	9556	9610	9663	9716	9770	9823	9877	9930	9984	*0037	53
813	910091	0144	0197	0251	0304	0358	0411	0464	0518	0571	53
814	0624	0678	0731	0784	0838	0891	0944	0998	1051	1104	53
815	911158	1211	1264	1317	1371	1424	1477	1530	1584	1637	53
816	1690	1743	1797	1850	1903	1956	2009	2063	2116	2169	53
817	2222	2275	2328	2381	2435	2488	2541	2594	2647	2700	53
818	2753	2806	2859	2913	2966	3019	3072	3125	3178	3231	53
819	3284	3337	3390	3443	3496	3549	3602	3655	3708	3761	53
820	913814	3867	3920	3973	4026	4079	4132	4184	4237	4290	53
821	4343	4396	4449	4502	4555	4608	4660	4713	4766	4819	53
822	4872	4925	4977	5030	5083	5136	5189	5241	5294	5347	53
823	5400	5453	5505	5558	5611	5664	5716	5769	5822	5875	53
824	5927	5980	6033	6085	6138	6191	6243	6296	6349	6401	53
825	916454	6507	6559	6612	6664	6717	6770	6822	6875	6927	53
826	6980	7033	7085	7138	7190	7243	7295	7348	7400	7453	53
827	7506	7558	7611	7663	7716	7768	7820	7873	7925	7978	52
828	8030	8083	8135	8188	8240	8293	8345	8397	8450	8502	52
829	8555	8607	8659	8712	8764	8816	8869	8921	8973	9026	52
830	919078	9130	9183	9235	9287	9340	9392	9444	9496	9549	52
831	9601	9653	9706	9758	9810	9862	9914	9967	*0019	*0071	52
832	920123	0176	0228	0280	0332	0384	0436	0489	0541	0593	52
833	0645	0697	0749	0801	0853	0906	0958	1010	1062	1114	52
834	1166	1218	1270	1322	1374	1426	1478	1530	1582	1634	52
835	921686	1738	1790	1842	1894	1946	1998	2050	2102	2154	52
836	2206	2258	2310	2362	2414	2466	2518	2570	2622	2674	52
837	2725	2777	2829	2881	2933	2985	3037	3089	3140	3192	52
838	3244	3296	3348	3399	3451	3503	3555	3607	3658	3710	52
839	3762	3814	3865	3917	3969	4021	4072	4124	4176	4228	52
840	924279	4331	4383	4434	4486	4538	4589	4641	4693	4744	52
841	4796	4848	4899	4951	5003	5054	5106	5157	5209	5261	52
842	5312	5364	5415	5467	5518	5570	5621	5673	5725	5776	52
843	5828	5879	5931	5982	6034	6085	6137	6188	6240	6291	51
844	6342	6394	6445	6497	6548	6600	6651	6702	6754	6805	51
845	926857	6908	6959	7011	7062	7114	7165	7216	7268	7319	51
846	7370	7422	7473	7524	7576	7627	7678	7730	7781	7832	51
847	7883	7935	7986	8037	8088	8140	8191	8242	8293	8345	51
848	8396	8447	8498	8549	8601	8652	8703	8754	8805	8857	51
849	8908	8959	9010	9061	9112	9163	9215	9266	9317	9368	51

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR. PTS.	55	6	11	17	22	28	33	39	44	50	55
	54	5	11	16	22	27	32	38	43	49	54
	53	5	11	16	21	27	32	37	42	48	53
	52	5	10	16	21	26	31	36	42	47	52
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
850	929419	9470	9521	9572	9623	9674	9725	9776	9827	9879	51
851	9930	9981	*0032	*0083	*0134	*0185	*0236	*0287	*0338	*0389	51
852	930440	0491	0542	0592	0643	0694	0745	0796	0847	0898	51
853	0949	1000	1051	1102	1153	1204	1254	1305	1356	1407	51
854	1458	1509	1560	1610	1661	1712	1763	1814	1865	1915	51
855	931966	2017	2068	2118	2169	2220	2271	2322	2372	2423	51
856	2474	2524	2575	2626	2677	2727	2778	2829	2879	2930	51
857	2981	3031	3082	3133	3183	3234	3285	3335	3386	3437	51
858	3487	3538	3589	3639	3690	3740	3791	3841	3892	3943	51
859	3993	4044	4094	4145	4195	4246	4296	4347	4397	4448	51
860	934498	4549	4599	4650	4700	4751	4801	4852	4902	4953	50
861	5003	5054	5104	5154	5205	5255	5306	5356	5406	5457	50
862	5507	5558	5608	5658	5709	5759	5809	5860	5910	5960	50
863	6011	6061	6111	6162	6212	6262	6313	6363	6413	6463	50
864	6514	6564	6614	6665	6715	6765	6815	6865	6916	6966	50
865	937016	7066	7117	7167	7217	7267	7317	7367	7418	7468	50
866	7518	7568	7618	7668	7718	7769	7819	7869	7919	7969	50
867	8019	8069	8119	8169	8219	8269	8320	8370	8420	8470	50
868	8520	8570	8620	8670	8720	8770	8820	8870	8920	8970	50
869	9020	9070	9120	9170	9220	9270	9320	9369	9419	9469	50
870	939519	9569	9619	9669	9719	9769	9819	9869	9918	9968	50
871	940018	0068	0118	0168	0218	0267	0317	0367	0417	0467	50
872	0516	0566	0616	0666	0716	0765	0815	0865	0915	0964	50
873	1014	1064	1114	1163	1213	1263	1313	1362	1412	1462	50
874	1511	1561	1611	1660	1710	1760	1809	1859	1909	1958	50
875	942008	2058	2107	2157	2207	2256	2306	2355	2405	2455	50
876	2504	2554	2603	2653	2702	2752	2801	2851	2901	2950	50
877	3000	3049	3099	3148	3198	3247	3297	3346	3396	3445	49
878	3495	3544	3593	3643	3692	3742	3791	3841	3890	3939	49
879	3989	4038	4088	4137	4186	4236	4285	4335	4384	4433	49
880	944483	4532	4581	4631	4680	4729	4779	4828	4877	4927	49
881	4976	5025	5074	5124	5173	5222	5272	5321	5370	5419	49
882	5469	5518	5567	5616	5665	5715	5764	5813	5862	5912	49
883	5961	6010	6059	6108	6157	6207	6256	6305	6354	6403	49
884	6452	6501	6551	6600	6649	6698	6747	6796	6845	6894	49
885	946943	6992	7041	7090	7140	7189	7238	7287	7336	7385	49
886	7434	7483	7532	7581	7630	7679	7728	7777	7826	7875	49
887	7924	7973	8022	8070	8119	8168	8217	8266	8315	8364	49
888	8413	8462	8511	8560	8609	8657	8706	8755	8804	8853	49
889	8902	8951	8999	9048	9097	9146	9195	9244	9292	9341	49
890	949390	9439	9488	9536	9585	9634	9683	9731	9780	9829	49
891	9878	9926	9975	*0024	*0073	*0121	*0170	*0219	*0267	*0316	49
892	950365	0414	0462	0511	0560	0608	0657	0706	0754	0803	49
893	0851	0900	0949	0997	1046	1095	1143	1192	1240	1289	49
894	1338	1386	1435	1483	1532	1580	1629	1677	1726	1775	49
895	951823	1872	1920	1969	2017	2066	2114	2163	2211	2260	48
896	2308	2356	2405	2453	2502	2550	2599	2647	2696	2744	48
897	2792	2841	2889	2938	2986	3034	3083	3131	3180	3228	48
898	3276	3325	3373	3421	3470	3518	3566	3615	3663	3711	48
899	3760	3808	3856	3905	3953	4001	4049	4098	4146	4194	48

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR. PTS.	51	5	10	15	20	26	31	36	41	46	51
	50	5	10	15	20	25	30	35	40	45	50
	49	5	10	15	20	25	29	34	39	44	49
	48	5	10	14	19	24	29	34	38	43	48
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
900	954243	4291	4339	4387	4435	4484	4532	4580	4628	4677	48
901	4725	4773	4821	4869	4918	4966	5014	5062	5110	5158	48
902	5207	5255	5303	5351	5399	5447	5495	5543	5592	5640	48
903	5688	5736	5784	5832	5880	5928	5976	6024	6072	6120	48
904	6168	6216	6265	6313	6361	6409	6457	6505	6553	6601	48
905	956649	6697	6745	6793	6840	6888	6936	6984	7032	7080	48
906	7128	7176	7224	7272	7320	7368	7416	7464	7512	7559	48
907	7607	7655	7703	7751	7799	7847	7894	7942	7990	8038	48
908	8086	8134	8181	8229	8277	8325	8373	8421	8468	8516	48
909	8564	8612	8659	8707	8755	8803	8850	8898	8946	8994	48
910	959041	9089	9137	9185	9232	9280	9328	9375	9423	9471	48
911	9518	9566	9614	9661	9709	9757	9804	9852	9900	9947	48
912	9995	*0042	*0090	*0138	*0185	*0233	*0280	*0328	*0376	*0423	48
913	960471	0518	0566	0613	0661	0709	0756	0804	0851	0899	48
914	0946	0994	1041	1089	1136	1184	1231	1279	1326	1374	48
915	961421	1469	1516	1563	1611	1658	1706	1753	1801	1848	47
916	1895	1943	1990	2038	2085	2132	2180	2227	2275	2322	47
917	2369	2417	2464	2511	2559	2606	2653	2701	2748	2795	47
918	2843	2890	2937	2985	3032	3079	3126	3174	3221	3268	47
919	3316	3363	3410	3457	3504	3552	3599	3646	3693	3741	47
920	963788	3835	3882	3929	3977	4024	4071	4118	4165	4212	47
921	4260	4307	4354	4401	4448	4495	4542	4590	4637	4684	47
922	4731	4778	4825	4872	4919	4966	5013	5061	5108	5155	47
923	5202	5249	5296	5343	5390	5437	5484	5531	5578	5625	47
924	5672	5719	5766	5813	5860	5907	5954	6001	6048	6095	47
925	966142	6189	6236	6283	6329	6376	6423	6470	6517	6564	47
926	6611	6658	6705	6752	6799	6845	6892	6939	6986	7033	47
927	7080	7127	7173	7220	7267	7314	7361	7408	7454	7501	47
928	7548	7595	7642	7688	7735	7782	7829	7875	7922	7969	47
929	8016	8062	8109	8156	8203	8249	8296	8343	8390	8436	47
930	968483	8530	8576	8623	8670	8716	8763	8810	8856	8903	47
931	8950	8996	9043	9090	9136	9183	9229	9276	9323	9369	47
932	9416	9463	9509	9556	9602	9649	9695	9742	9789	9835	47
933	9882	9928	9975	*0021	*0068	*0114	*0161	*0207	*0254	*0300	47
934	970347	0393	0440	0486	0533	0579	0626	0672	0719	0765	46
935	970812	0858	0904	0951	0997	1044	1090	1137	1183	1229	46
936	1276	1322	1369	1415	1461	1508	1554	1601	1647	1693	46
937	1740	1786	1832	1879	1925	1971	2018	2064	2110	2157	46
938	2203	2249	2295	2342	2388	2434	2481	2527	2573	2619	46
939	2666	2712	2758	2804	2851	2897	2943	2989	3035	3082	46
940	973128	3174	3220	3266	3313	3359	3405	3451	3497	3543	46
941	3590	3636	3682	3728	3774	3820	3866	3913	3959	4005	46
942	4051	4097	4143	4189	4235	4281	4327	4374	4420	4466	46
943	4512	4558	4604	4650	4696	4742	4788	4834	4880	4926	46
944	4972	5018	5064	5110	5156	5202	5248	5294	5340	5386	46
945	975432	5478	5524	5570	5616	5662	5707	5753	5799	5845	46
946	5891	5937	5983	6029	6075	6121	6167	6212	6258	6304	46
947	6350	6396	6442	6488	6533	6579	6625	6671	6717	6763	46
948	6808	6854	6900	6946	6992	7037	7083	7129	7175	7220	46
949	7266	7312	7358	7403	7449	7495	7541	7586	7632	7678	46

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR. PTS.	49	5	10	15	20	25	29	34	39	44	49
	48	5	10	14	19	24	29	34	38	43	48
	47	5	9	14	19	24	28	33	38	42	47
	46	5	9	14	18	23	28	32	37	41	46
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9
950	977724	7769	7815	7861	7906	7952	7998	8043	8089	8135
951	8181	8226	8272	8317	8363	8409	8454	8500	8546	8591
952	8637	8683	8728	8774	8819	8865	8911	8956	9002	9047
953	9093	9138	9184	9230	9275	9321	9366	9412	9457	9503
954	9548	9594	9639	9685	9730	9776	9821	9867	9912	9958
955	980003	0049	0094	0140	0185	0231	0276	0322	0367	0412
956	0458	0503	0549	0594	0640	0685	0730	0776	0821	0867
957	0912	0957	1003	1048	1093	1139	1184	1229	1275	1320
958	1366	1411	1456	1501	1547	1592	1637	1683	1728	1773
959	1819	1864	1909	1954	2000	2045	2090	2135	2181	2226
960	982271	2316	2362	2407	2452	2497	2543	2588	2633	2678
961	2723	2769	2814	2859	2904	2949	2994	3040	3085	3130
962	3175	3220	3265	3310	3356	3401	3446	3491	3536	3581
963	3626	3671	3716	3762	3807	3852	3897	3942	3987	4032
964	4077	4122	4167	4212	4257	4302	4347	4392	4437	4482
965	984527	4572	4617	4662	4707	4752	4797	4842	4887	4932
966	4977	5022	5067	5112	5157	5202	5247	5292	5337	5382
967	5426	5471	5516	5561	5606	5651	5696	5741	5786	5830
968	5875	5920	5965	6010	6055	6100	6144	6189	6234	6279
969	6324	6369	6413	6458	6503	6548	6593	6637	6682	6727
970	986772	6817	6861	6906	6951	6996	7040	7085	7130	7175
971	7219	7264	7309	7353	7398	7443	7488	7532	7577	7622
972	7666	7711	7756	7800	7845	7890	7934	7979	8024	8068
973	8113	8157	8202	8247	8291	8336	8381	8425	8470	8514
974	8559	8604	8648	8693	8737	8782	8826	8871	8916	8960
975	989005	9049	9094	9138	9183	9227	9272	9316	9361	9405
976	9450	9494	9539	9583	9628	9672	9717	9761	9806	9850
977	9895	9939	9983	*0028	*0072	*0117	*0161	*0206	*0250	*0294
978	990339	0383	0428	0472	0516	0561	0605	0650	0694	0738
979	0783	0827	0871	0916	0960	1004	1049	1093	1137	1182
980	991226	1270	1315	1359	1403	1448	1492	1536	1580	1625
981	1669	1713	1758	1802	1846	1890	1935	1979	2023	2067
982	2111	2156	2200	2244	2288	2333	2377	2421	2465	2509
983	2554	2598	2642	2686	2730	2774	2819	2863	2907	2951
984	2995	3039	3083	3127	3172	3216	3260	3304	3348	3392
985	993436	3480	3524	3568	3613	3657	3701	3745	3789	3833
986	3877	3921	3965	4009	4053	4097	4141	4185	4229	4273
987	4317	4361	4405	4449	4493	4537	4581	4625	4669	4713
988	4757	4801	4845	4889	4933	4977	5021	5065	5108	5152
989	5196	5240	5284	5328	5372	5416	5460	5504	5547	5591
990	995635	5679	5723	5767	5811	5854	5898	5942	5986	6030
991	6074	6117	6161	6205	6249	6293	6337	6380	6424	6468
992	6512	6555	6599	6643	6687	6731	6774	6818	6862	6906
993	6949	6993	7037	7080	7124	7168	7212	7255	7299	7343
994	7386	7430	7474	7517	7561	7605	7648	7692	7736	7779
995	997823	7867	7910	7954	7998	8041	8085	8129	8172	8216
996	8259	8303	8347	8390	8434	8477	8521	8564	8608	8652
997	8695	8739	8782	8826	8869	8913	8956	9000	9043	9087
998	9131	9174	9218	9261	9305	9348	9392	9435	9479	9522
999	9565	9609	9652	9696	9739	9783	9826	9870	9913	9957

N.	Diff.	1	2	3	4	5	6	7	8	9
PR. PTS.	46	5	9	14	18	23	28	32	37	41
	45	5	9	14	18	23	27	32	36	41
	44	4	9	13	18	22	26	31	35	40
	43	4	9	13	17	22	26	30	34	39
	Diff.	1	2	3	4	5	6	7	8	9

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
1000	000000	0043	0087	0130	0174	0217	0260	0304	0347	0391	43
1001	0434	0477	0521	0564	0608	0651	0694	0738	0781	0824	43
1002	0868	0911	0954	0998	1041	1084	1128	1171	1214	1258	43
1003	1301	1344	1388	1431	1474	1517	1561	1604	1647	1690	43
1004	1734	1777	1820	1863	1907	1950	1993	2036	2080	2123	43
1005	002166	2209	2252	2296	2339	2382	2425	2468	2512	2555	43
1006	2598	2641	2684	2727	2771	2814	2857	2900	2943	2986	43
1007	3029	3073	3116	3159	3202	3245	3288	3331	3374	3417	43
1008	3461	3504	3547	3590	3633	3676	3719	3762	3805	3848	43
1009	3891	3934	3977	4020	4063	4106	4149	4192	4235	4278	43
1010	004321	4364	4407	4450	4493	4536	4579	4622	4665	4708	43
1011	4751	4794	4837	4880	4923	4966	5009	5052	5095	5138	43
1012	5181	5223	5266	5309	5352	5395	5438	5481	5524	5567	43
1013	5609	5652	5695	5738	5781	5824	5867	5909	5952	5995	43
1014	6038	6081	6124	6166	6209	6252	6295	6338	6380	6423	43
1015	006466	6509	6552	6594	6637	6680	6723	6765	6808	6851	43
1016	6894	6936	6979	7022	7065	7107	7150	7193	7236	7278	43
1017	7321	7364	7406	7449	7492	7534	7577	7620	7662	7705	43
1018	7748	7790	7833	7876	7918	7961	8004	8046	8089	8132	43
1019	8174	8217	8259	8302	8345	8387	8430	8472	8515	8558	43
1020	008600	8643	8685	8728	8770	8813	8856	8898	8941	8983	43
1021	9026	9068	9111	9153	9196	9238	9281	9323	9366	9408	42
1022	9451	9493	9536	9578	9621	9663	9706	9748	9791	9833	42
1023	9876	9918	9961	*0003	*0045	*0088	*0130	*0173	*0215	*0258	42
1024	010300	0342	0385	0427	0470	0512	0554	0597	0639	0681	42
1025	010724	0766	0809	0851	0893	0936	0978	1020	1063	1105	42
1026	1147	1190	1232	1274	1317	1359	1401	1444	1486	1528	42
1027	1570	1613	1655	1697	1740	1782	1824	1866	1909	1951	42
1028	1993	2035	2078	2120	2162	2204	2247	2289	2331	2373	42
1029	2415	2458	2500	2542	2584	2626	2669	2711	2753	2795	42
1030	012837	2879	2922	2964	3006	3048	3090	3132	3174	3217	42
1031	3259	3301	3343	3385	3427	3469	3511	3553	3596	3638	42
1032	3680	3722	3764	3806	3848	3890	3932	3974	4016	4058	42
1033	4100	4142	4184	4226	4268	4310	4353	4395	4437	4479	42
1034	4521	4563	4605	4647	4689	4730	4772	4814	4856	4898	42
1035	014940	4982	5024	5066	5108	5150	5192	5234	5276	5318	42
1036	5360	5402	5444	5485	5527	5569	5611	5653	5695	5737	42
1037	5779	5821	5863	5904	5946	5988	6030	6072	6114	6156	42
1038	6197	6239	6281	6323	6365	6407	6448	6490	6532	6574	42
1039	6616	6657	6699	6741	6783	6824	6866	6908	6950	6992	42
1040	017033	7075	7117	7159	7200	7242	7284	7326	7367	7409	42
1041	7451	7492	7534	7576	7618	7659	7701	7743	7784	7826	42
1042	7868	7909	7951	7993	8034	8076	8118	8159	8201	8243	42
1043	8284	8326	8368	8409	8451	8492	8534	8576	8617	8659	42
1044	8700	8742	8784	8825	8867	8908	8950	8992	9033	9075	42
1045	019116	9158	9199	9241	9282	9324	9366	9407	9449	9490	42
1046	9532	9573	9615	9656	9698	9739	9781	9822	9864	9905	41
1047	9947	9988	*0030	*0071	*0113	*0154	*0195	*0237	*0278	*0320	41
1048	020361	0403	0444	0486	0527	0568	0610	0651	0693	0734	41
1049	0775	0817	0858	0900	0941	0982	1024	1065	1107	1148	41
1050	021189	1231	1272	1313	1355	1396	1437	1479	1520	1561	41

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR. PTS.	44	4	9	13	18	22	26	31	35	40	44
	43	4	9	13	17	22	26	30	34	39	43
	42	4	8	13	17	21	25	29	34	38	42
	41	4	8	12	16	21	25	29	33	37	41
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	— ∞		10.000000		— ∞		— ∞	60
1	6.463726	5017.17	.000000	.00	6.463726	5017.17	3.536274	59
2	.764756	2934.85	.000000	.00	.764756	2934.85	.235244	58
3	.940847	2082.32	.000000	.00	.940847	2082.32	.059153	57
4	7.065786	1615.17	.000000	.00	7.065786	1615.17	2.934214	56
5	7.162696	1319.68	10.000000	.02	7.162696	1319.70	2.837304	55
6	.241877	1115.78	9.999999	.00	.241878	1115.78	.758122	54
7	.308824	966.53	.999999	.00	.308825	966.53	.691175	53
8	.366816	852.53	.999999	.00	.366817	852.55	.633183	52
9	.417968	762.63	.999999	.02	.417970	762.62	.582030	51
10	7.463726	689.87	9.999998	.00	7.463727	689.88	2.536273	50
11	.505118	629.80	.999998	.02	.505120	629.82	.494880	49
12	.542906	579.37	.999997	.00	.542909	579.38	.457091	48
13	.577668	536.42	.999997	.02	.577672	536.42	.422328	47
14	.609853	499.38	.999996	.00	.609857	499.38	.390143	46
15	7.639816	467.15	9.999996	.02	7.639820	467.15	2.360180	45
16	.667845	438.80	.999995	.00	.667849	438.83	.332151	44
17	.694173	413.73	.999995	.02	.694179	413.73	.305821	43
18	.718997	391.35	.999994	.02	.719003	391.35	.280997	42
19	.742478	371.27	.999993	.00	.742484	371.28	.257516	41
20	7.764754	353.15	9.999993	.02	7.764761	353.17	2.235239	40
21	.785943	336.72	.999992	.02	.785951	336.73	.214049	39
22	.806146	321.75	.999991	.02	.806155	321.75	.193845	38
23	.825451	308.05	.999990	.02	.825460	308.07	.174540	37
24	.843934	295.47	.999989	.00	.843944	295.50	.156056	36
25	7.861662	283.88	9.999989	.02	7.861674	283.90	2.138326	35
26	.878695	273.17	.999988	.02	.878708	273.18	.121292	34
27	.895085	263.23	.999987	.02	.895099	263.25	.104901	33
28	.910879	254.00	.999986	.02	.910894	254.00	.089106	32
29	.926119	245.38	.999985	.03	.926134	245.40	.073866	31
30	7.940842	237.33	9.999983	.02	7.940858	237.37	2.059142	30
31	.955082	229.80	.999982	.02	.955100	229.82	.044900	29
32	.968870	222.72	.999981	.02	.968889	222.73	.031111	28
33	.982233	216.08	.999980	.02	.982253	216.10	.017747	27
34	.995198	209.82	.999979	.03	.995219	209.83	.004781	26
35	8.007787	203.90	9.999977	.02	8.007809	203.92	1.992191	25
36	.020021	198.30	.999976	.02	.020044	198.35	.979956	24
37	.031919	193.03	.999975	.03	.031945	193.03	.968055	23
38	.043501	188.00	.999973	.02	.043527	188.03	.956473	22
39	.054781	183.25	.999972	.02	.054809	183.28	.945191	21
40	8.065776	178.73	9.999971	.03	8.065806	178.75	1.934194	20
41	.076500	174.42	.999969	.02	.076531	174.43	.923469	19
42	.086965	170.30	.999968	.03	.086997	170.33	.913003	18
43	.097183	166.40	.999966	.03	.097217	166.43	.902783	17
44	.107167	162.65	.999964	.02	.107203	162.67	.892797	16
45	8.116926	159.08	9.999963	.03	8.116963	159.12	1.883037	15
46	.126471	155.65	.999961	.03	.126510	155.68	.873490	14
47	.135810	152.38	.999959	.02	.135851	152.42	.864149	13
48	.144953	149.23	.999958	.03	.144996	149.27	.855004	12
49	.153907	146.23	.999956	.03	.153952	146.25	.846048	11
50	8.162681	143.32	9.999954	.03	8.162727	143.35	1.837273	10
51	.171280	140.55	.999952	.03	.171328	140.58	.828672	9
52	.179713	137.87	.999950	.03	.179763	137.88	.820237	8
53	.187985	135.28	.999948	.03	.188036	135.33	.811964	7
54	.196102	132.80	.999946	.03	.196156	132.83	.803844	6
55	8.204070	130.42	9.999944	.03	8.204126	130.45	1.795874	5
56	.211895	128.10	.999942	.03	.211953	128.13	.788047	4
57	.219581	125.88	.999940	.03	219641	125.90	.780359	3
58	.227134	123.72	.999938	.03	.227195	123.77	.772805	2
59	.234557	121.63	.999936	.03	.234621	121.67	.765379	1
60	8.241855		9.999934		8.241921		1.758079	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.241855	119.63	9.999934	.03	8.241921	119.68	1.758079	6
1	.249033	117.68	.999932	.05	.249102	117.72	.750898	5
2	.256094	115.80	.999929	.03	.256165	115.83	.743835	5
3	.263042	113.98	.999927	.03	.263115	114.02	.736885	5
4	.269881	112.22	.999925	.05	.269956	112.25	.730044	5
5	8.276614	110.48	9.999922	.03	8.276691	110.53	1.723309	5
6	.283243	108.83	.999920	.03	.283323	108.88	.716677	5
7	.289773	107.23	.999918	.05	.289856	107.27	.710144	5
8	.296207	105.65	.999915	.03	.296292	105.70	.703708	5
9	.302546	104.13	.999913	.05	.302634	104.17	.697366	51
10	8.308794	102.67	9.999910	.05	8.308884	102.70	1.691116	50
11	.314954	101.22	.999907	.03	.315046	101.27	.684954	49
12	.321027	99.82	.999905	.05	.321122	99.87	.678878	48
13	.327016	98.47	.999902	.05	.327114	98.52	.672886	47
14	.332924	97.15	.999899	.03	.333025	97.18	.666975	46
15	8.338753	95.85	9.999897	.05	8.338856	95.90	1.661144	45
16	.344504	94.62	.999894	.05	.344610	94.65	.655390	44
17	.350181	93.37	.999891	.05	.350289	93.43	.649711	43
18	.355783	92.20	.999888	.05	.355895	92.25	.644105	42
19	.361315	91.03	.999885	.05	.361430	91.08	.638570	41
20	8.366777	89.90	9.999882	.05	8.366895	89.95	1.633105	40
21	.372171	88.80	.999879	.05	.372292	88.83	.627708	39
22	.377499	87.72	.999876	.05	.377622	87.78	.622378	38
23	.382762	86.67	.999873	.05	.382889	86.72	.617111	37
24	.387962	85.65	.999870	.05	.388092	85.70	.611908	36
25	8.393101	84.63	9.999867	.05	8.393234	84.68	1.606766	35
26	.398179	83.67	.999864	.05	.398315	83.72	.601685	34
27	.403199	82.70	.999861	.05	.403338	82.77	.596662	33
28	.408161	81.78	.999858	.07	.408304	81.82	.591696	32
29	.413068	80.85	.999854	.05	.413213	80.92	.586787	31
30	8.417919	79.97	9.999851	.05	8.418068	80.02	1.581932	30
31	.422717	79.08	.999848	.07	.422869	79.15	.577131	29
32	.427462	78.23	.999844	.05	.427618	78.28	.572382	28
33	.432156	77.40	.999841	.05	.432315	77.45	.567685	27
34	.436800	76.57	.999838	.07	.436962	76.63	.563038	26
35	8.441394	75.78	9.999834	.05	8.441560	75.83	1.558440	25
36	.445941	74.98	.999831	.07	.446110	75.05	.553890	24
37	.450440	74.22	.999827	.05	.450613	74.28	.549387	23
38	.454893	73.47	.999824	.07	.455070	73.52	.544930	22
39	.459301	72.73	.999820	.07	.459481	72.80	.540519	21
40	8.463665	72.00	9.999816	.05	8.463849	72.05	1.536151	20
41	.467985	71.30	.999813	.07	.468172	71.37	.531828	19
42	.472263	70.58	.999809	.07	.472454	70.65	.527546	18
43	.476498	69.92	.999805	.07	.476693	69.98	.523307	17
44	.480693	69.25	.999801	.07	.480892	69.30	.519108	16
45	8.484848	68.58	9.999797	.05	8.485050	68.67	1.514950	15
46	.488963	67.95	.999794	.07	.489170	68.00	.510830	14
47	.493040	67.30	.999790	.07	.493250	67.38	.506750	13
48	.497078	66.70	.999786	.07	.497293	66.75	.502707	12
49	.501080	66.08	.999782	.07	.501298	66.15	.498702	11
50	8.505045	65.48	9.999778	.07	8.505267	65.55	1.494733	10
51	.508974	64.88	.999774	.08	.509200	64.97	.490800	9
52	.512867	64.32	.999769	.07	.513098	64.38	.486902	8
53	.516726	63.75	.999765	.07	.516961	63.82	.483039	7
54	.520551	63.20	.999761	.07	.520790	63.27	.479210	6
55	8.524343	62.65	9.999757	.07	8.524586	62.72	1.475414	5
56	.528102	62.10	.999753	.08	.528349	62.18	.471651	4
57	.531828	61.58	.999748	.07	.532080	61.65	.467920	3
58	.535523	61.05	.999744	.07	.535779	61.13	.464221	2
59	.539186	60.55	.999740	.08	.539447	60.62	.460553	1
60	8.542819		9.999735		8.543084		1.456916	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.542819	60.05	9.999735	.07	8.543084	60.12	1.456916	60
1	.546422	59.55	.999731	.08	.546691	59.62	.453309	59
2	.549995	59.07	.999726	.07	.550268	59.15	.449732	58
3	.553539	58.58	.999722	.08	.553817	58.65	.446183	57
4	.557054	58.10	.999717	.07	.557336	58.20	.442664	56
5	8.560540	57.65	9.999713	.08	8.560828	57.72	1.439172	55
6	.563999	57.20	.999708	.07	.564291	57.27	.435709	54
7	.567431	56.75	.999704	.08	.567727	56.83	.432273	53
8	.570836	56.30	.999699	.08	.571137	56.38	.428863	52
9	.574214	55.87	.999694	.08	.574520	55.95	.425480	51
10	8.577566	55.43	9.999689	.07	8.577877	55.52	1.422123	50
11	.580892	55.02	.999685	.08	.581208	55.10	.418792	49
12	.584193	54.60	.999680	.08	.584514	54.68	.415486	48
13	.587469	54.20	.999675	.08	.587795	54.27	.412205	47
14	.590721	53.78	.999670	.08	.591051	53.87	.408949	46
15	8.593948	53.40	9.999665	.08	8.594283	53.48	1.405717	45
16	.597152	53.00	.999660	.08	.597492	53.08	.402508	44
17	.600332	52.62	.999655	.08	.600677	52.70	.399323	43
18	.603489	52.23	.999650	.08	.603839	52.32	.396161	42
19	.606623	51.85	.999645	.08	.606978	51.93	.393022	41
20	8.609734	51.48	9.999640	.08	8.610094	51.58	1.389906	40
21	.612823	51.13	.999635	.10	.613189	51.22	.386811	39
22	.615891	50.77	.999629	.08	.616262	50.85	.383738	38
23	.618937	50.42	.999624	.08	.619313	50.50	.380687	37
24	.621962	50.05	.999619	.08	.622343	50.15	.377657	36
25	8.624965	49.72	9.999614	.10	8.625352	49.80	1.374648	35
26	.627948	49.38	.999608	.08	.628340	49.47	.371660	34
27	.630911	49.05	.999603	.10	.631308	49.13	.368692	33
28	.633854	48.70	.999597	.08	.634256	48.80	.365744	32
29	.636776	48.40	.999592	.10	.637184	48.48	.362816	31
30	8.639680	48.05	9.999586	.08	8.640093	48.15	1.359907	30
31	.642563	47.75	.999581	.10	.642982	47.85	.357018	29
32	.645428	47.43	.999575	.08	.645853	47.52	.354147	28
33	.648274	47.13	.999570	.10	.648704	47.22	.351296	27
34	.651102	46.82	.999564	.10	.651537	46.92	.348463	26
35	8.653911	46.52	9.999558	.08	8.654352	46.62	1.345648	25
36	.656702	46.22	.999553	.10	.657149	46.32	.342851	24
37	.659475	45.92	.999547	.10	.659928	46.02	.340072	23
38	.662230	45.63	.999541	.10	.662689	45.73	.337311	22
39	.664968	45.35	.999535	.10	.665433	45.45	.334567	21
40	8.667689	45.07	9.999529	.08	8.668160	45.17	1.331840	20
41	.670393	44.78	.999524	.10	.670870	44.88	.329130	19
42	.673080	44.52	.999518	.10	.673563	44.60	.326437	18
43	.675751	44.23	.999512	.10	.676239	44.35	.323761	17
44	.678405	43.97	.999506	.10	.678900	44.07	.321100	16
45	8.681043	43.70	9.999500	.12	8.681544	43.80	1.318456	15
46	.683665	43.45	.999493	.10	.684172	43.53	.315828	14
47	.686272	43.18	.999487	.10	.686784	43.28	.313216	13
48	.688863	42.92	.999481	.10	.689381	43.03	.310619	12
49	.691438	42.67	.999475	.10	.691963	42.77	.308037	11
50	8.693998	42.42	9.999469	.10	8.694529	42.53	1.305471	10
51	.696543	42.17	.999463	.12	.697081	42.27	.302919	9
52	.699073	41.93	.999456	.10	.699617	42.03	.300383	8
53	.701589	41.68	.999450	.12	.702139	41.78	.297861	7
54	.704090	41.45	.999443	.10	.704646	41.57	.295354	6
55	8.706577	41.20	9.999437	.10	8.707140	41.30	1.292860	5
56	.709049	40.97	.999431	.12	.709618	41.08	.290382	4
57	.711507	40.75	.999424	.10	.712083	40.85	.287917	3
58	.713952	40.52	.999418	.12	.714534	40.63	.285466	2
59	.716383	40.28	.999411	.12	.716972	40.40	.283028	1
60	8.718800		9.999404		8.719396		1.280604	0
	Cos.	**D. 1″.**	**Sin.**	**D. 1″.**	**Cot.**	**D. 1″.**	**Tan.**	**M.**

92° 87°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.718800	40.07	9.999404	.10	8.719396	40.17	1.280604	60
1	.721204	39.85	.999398	.12	.721806	39.97	.278194	59
2	.723595	39.62	.999391	.12	.724204	39.73	.275796	58
3	.725972	39.42	.999384	.10	.726588	39.52	.273412	57
4	.728337	39.18	.999378	.12	.728959	39.30	.271041	56
5	8.730688	38.98	9.999371	.12	8.731317	39.10	1.268683	55
6	.733027	38.78	.999364	.12	.733663	38.88	.266337	54
7	.735354	38.55	.999357	.12	.735996	38.68	.264004	53
8	.737667	38.37	.999350	.12	.738317	38.48	.261683	52
9	.739969	38.17	.999343	.12	.740626	38.27	.259374	51
10	8.742259	37.95	9.999336	.12	8.742922	38.08	1.257078	50
11	.744536	37.77	.999329	.12	.745207	37.87	.254793	49
12	.746802	37.55	.999322	.12	.747479	37.68	.252521	48
13	.749055	37.37	.999315	.12	.749740	37.48	.250260	47
14	.751297	37.18	.999308	.12	.751989	37.30	.248011	46
15	8.753528	36.98	9.999301	.12	8.754227	37.10	1.245773	45
16	.755747	36.80	.999294	.12	.756453	36.92	.243547	44
17	.757955	36.60	.999287	.13	.758668	36.73	.241332	43
18	.760151	36.43	.999279	.12	.760872	36.55	.239128	42
19	.762337	36.23	.999272	.12	.763065	36.35	.236935	41
20	8.764511	36.07	9.999265	.13	8.765246	36.18	1.234754	40
21	.766675	35.88	.999257	.12	.767417	36.02	.232583	39
22	.768828	35.70	.999250	.13	.769578	35.82	.230422	38
23	.770970	35.52	.999242	.12	.771727	35.65	.228273	37
24	.773101	35.37	.999235	.13	.773866	35.48	.226134	36
25	8.775223	35.17	9.999227	.12	8.775995	35.32	1.224005	35
26	.777333	35.02	.999220	.13	.778114	35.13	.221886	34
27	.779434	34.83	.999212	.12	.780222	34.97	.219778	33
28	.781524	34.68	.999205	.13	.782320	34.80	.217680	32
29	.783605	34.50	.999197	.13	.784408	34.63	.215592	31
30	8.785675	34.35	9.999189	.13	8.786486	34.47	1.213514	30
31	.787736	34.18	.999181	.12	.788554	34.32	.211446	29
32	.789787	34.02	.999174	.13	.790613	34.15	.209387	28
33	.791828	33.85	.999166	.13	.792662	33.98	.207338	27
34	.793859	33.70	.999158	.13	.794701	33.83	.205299	26
35	8.795881	33.55	9.999150	.13	8.796731	33.68	1.203269	25
36	.797894	33.38	.999142	.13	.798752	33.52	.201248	24
37	.799897	33.25	.999134	.13	.800763	33.37	.199237	23
38	.801892	33.07	.999126	.13	.802765	33.22	.197235	22
39	.803876	32.93	.999118	.13	.804758	33.07	.195242	21
40	8.805852	32.78	9.999110	.13	8.806742	32.92	1.193258	20
41	.807819	32.63	.999102	.13	.808717	32.77	.191283	19
42	.809777	32.48	.999094	.13	.810683	32.63	.189317	18
43	.811726	32.35	.999086	.15	.812641	32.47	.187359	17
44	.813667	32.20	.999077	.13	.814589	32.33	.185411	16
45	8.815599	32.05	9.999069	.13	8.816529	32.20	1.183471	15
46	.817522	31.90	.999061	.13	.818461	32.05	.181539	14
47	.819436	31.78	.999053	.15	.820384	31.90	.179616	13
48	.821343	31.62	.999044	.13	.822298	31.78	.177702	12
49	.823240	31.50	.999036	.15	.824205	31.63	.175795	11
50	8.825130	31.35	9.999027	.13	8.826103	31.48	1.173897	10
51	.827011	31.22	.999019	.15	.827992	31.37	.172008	9
52	.828884	31.08	.999010	.13	.829874	31.23	.170126	8
53	.830749	30.97	.999002	.15	.831748	31.08	.168252	7
54	.832607	30.82	.998993	.15	.833613	30.97	.166387	6
55	8.834456	30.68	9.998984	.13	8.835471	30.83	1.164529	5
56	.836297	30.55	.998976	.15	.837321	30.70	.162679	4
57	.838130	30.43	.998967	.15	.839163	30.58	.160837	3
58	.839956	30.30	.998958	.13	.840998	30.45	.159002	2
59	.841774	30.18	.998950	.15	.842825	30.32	.157175	1
60	8.843585		9.998941		8.844644		1.155356	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.843585	30.03	9.998941	.15	8.844644	30.18	1.155356	60
1	.845387	29.93	.998932	.15	.846455	30.08	.153545	59
2	.847183	29.80	.998923	.15	.848260	29.95	.151740	58
3	.848971	29.67	.998914	.15	.850057	29.82	.149943	57
4	.850751	29.57	.998905	.15	.851846	29.70	.148154	56
5	8.852525	29.43	9.998896	.15	8.853628	29.58	1.146372	55
6	.854291	29.30	.998887	.15	.855403	29.47	.144597	54
7	.856049	29.20	.998878	.15	.857171	29.35	.142829	53
8	.857801	29.08	.998869	.15	.858932	29.23	.141068	52
9	.859546	28.95	.998860	.15	.860686	29.12	.139314	51
10	8.861283	28.85	9.998851	.17	8.862433	29.00	1.137567	50
11	.863014	28.73	.998841	.15	.864173	28.88	.135827	49
12	.864738	28.62	.998832	.15	.865906	28.77	.134094	48
13	.866455	28.50	.998823	.17	.867632	28.65	.132368	47
14	.868165	28.38	.998813	.15	.869351	28.55	.130649	46
15	8.869868	28.28	9.998804	.15	8.871064	28.43	1.128936	45
16	.871565	28.17	.998795	.17	.872770	28.32	.127230	44
17	.873255	28.05	.998785	.15	.874469	28.22	.125531	43
18	.874938	27.95	.998776	.17	.876162	28.12	.123838	42
19	.876615	27.83	.998766	.15	.877849	28.00	.122151	41
20	8.878285	27.73	9.998757	.17	8.879529	27.88	1.120471	40
21	.879949	27.63	.998747	.15	.881202	27.78	.118798	39
22	.881607	27.52	.998738	.17	.882869	27.68	.117131	38
23	.883258	27.42	.998728	.17	.884530	27.58	.115470	37
24	.884903	27.32	.998718	.17	.886185	27.47	.113815	36
25	8.886542	27.20	9.998708	.15	8.887833	27.38	1.112167	35
26	.888174	27.12	.998699	.17	.889476	27.27	.110524	34
27	.889801	27.00	.998689	.17	.891112	27.17	.108888	33
28	.891421	26.90	.998679	.17	.892742	27.07	.107258	32
29	.893035	26.80	.998669	.17	.894366	26.97	.105634	31
30	8.894643	26.72	9.998659	.17	8.895984	26.87	1.104016	30
31	.896246	26.60	.998649	.17	.897596	26.78	.102404	29
32	.897842	26.50	.998639	.17	.899203	26.67	.100797	28
33	.899432	26.42	.998629	.17	.900803	26.58	.099197	27
34	.901017	26.32	.998619	.17	.902398	26.48	.097602	26
35	8.902596	26.22	9.998609	.17	8.903987	26.38	1.096013	25
36	.904169	26.12	.998599	.17	.905570	26.28	.094430	24
37	.905736	26.02	.998589	.18	.907147	26.20	.092853	23
38	.907297	25.93	.998578	.17	.908719	26.10	.091281	22
39	.908853	25.85	.998568	.17	.910285	26.02	.089715	21
40	8.910404	25.75	9.998558	.17	8.911846	25.92	1.088154	20
41	.911949	25.65	.998548	.18	.913401	25.83	.086599	19
42	.913488	25.57	.998537	.17	.914951	25.73	.085049	18
43	.915022	25.47	.998527	.18	.916495	25.65	.083505	17
44	.916550	25.38	.998516	.17	.918034	25.57	.081966	16
45	8.918073	25.30	9.998506	.18	8.919568	25.47	1.080432	15
46	.919591	25.20	.998495	.17	.921096	25.38	.078904	14
47	.921103	25.12	.998485	.18	.922619	25.28	.077381	13
48	.922610	25.03	.998474	.17	.924136	25.22	.075864	12
49	.924112	24.95	.998464	.18	.925649	25.12	.074351	11
50	8.925609	24.85	9.998453	.18	8.927156	25.03	1.072844	10
51	.927100	24.78	.998442	.18	.928658	24.95	.071342	9
52	.928587	24.68	.998431	.17	.930155	24.87	.069845	8
53	.930068	24.60	.998421	.18	.931647	24.78	.068353	7
54	.931544	24.52	.998410	.18	.933134	24.70	.066866	6
55	8.933015	24.43	9.998399	.18	8.934616	24.62	1.065384	5
56	.934481	24.35	.998388	.18	.936093	24.53	.063907	4
57	.935942	24.27	.998377	.18	.937565	24.45	.062435	3
58	.937398	24.20	.998366	.18	.939032	24.37	.060968	2
59	.938850	24.10	.998355	.18	.940494	24.30	.059506	1
60	8.940296		9.998344		8.941952		1.058048	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.940296	24.03	9.998344	.18	8.941952	24.20	1.058048	60
1	.941738	23.93	.998333	.18	.943404	24.13	.056596	59
2	.943174	23.87	.998322	.18	.944852	24.05	.055148	58
3	.944606	23.80	.998311	.18	.946295	23.98	.053705	57
4	.946034	23.70	.998300	.18	.947734	23.90	.052266	56
5	8.947456	23.63	9.998289	.20	8.949168	23.82	1.050832	55
6	.948874	23.55	.998277	.18	.950597	23.73	.049403	54
7	.950287	23.48	.998266	.18	.952021	23.67	.047979	53
8	.951696	23.40	.998255	.20	.953441	23.58	.046559	52
9	.953100	23.32	.998243	.18	.954856	23.52	.045144	51
10	8.954499	23.25	9.998232	.20	8.956267	23.45	1.043733	50
11	.955894	23.17	.998220	.18	.957674	23.35	.042326	49
12	.957284	23.10	.998209	.20	.959075	23.30	.040925	48
13	.958670	23.03	.998197	.18	.960473	23.22	.039527	47
14	.960052	22.95	.998186	.20	.961866	23.15	.038134	46
15	8.961429	22.87	9.998174	.18	8.963255	23.07	1.036745	45
16	.962801	22.82	.998163	.20	.964639	23.00	.035361	44
17	.964170	22.73	.998151	.20	.966019	22.92	.033981	43
18	.965534	22.65	.998139	.18	.967394	22.87	.032606	42
19	.966893	22.60	.998128	.20	.968766	22.78	.031234	41
20	8.968249	22.52	9.998116	.20	8.970133	22.72	1.029867	40
21	.969600	22.45	.998104	.20	.971496	22.65	.028504	39
22	.970947	22.37	.998092	.20	.972855	22.57	.027145	38
23	.972289	22.32	.998080	.20	.974209	22.52	.025791	37
24	.973628	22.23	.998068	.20	.975560	22.43	.024440	36
25	8.974962	22.18	9.998056	.20	8.976906	22.37	1.023094	35
26	.976293	22.10	.998044	.20	.978248	22.30	.021752	34
27	.977619	22.03	.998032	.20	.979586	22.25	.020414	33
28	.978941	21.97	.998020	.20	.980921	22.17	.019079	32
29	.980259	21.90	.998008	.20	.982251	22.10	.017749	31
30	8.981573	21.83	9.997996	.20	8.983577	22.03	1.016423	30
31	.982883	21.77	.997984	.20	.984899	21.97	.015101	29
32	.984189	21.70	.997972	.22	.986217	21.92	.013783	28
33	.985491	21.63	.997959	.20	.987532	21.83	.012468	27
34	.986789	21.57	.997947	.20	.988842	21.78	.011158	26
35	8.988083	21.52	9.997935	.22	8.990149	21.70	1.009851	25
36	.989374	21.43	.997922	.20	.991451	21.65	.008549	24
37	.990660	21.38	.997910	.22	.992750	21.58	.007250	23
38	.991943	21.32	.997897	.20	.994045	21.53	.005955	22
39	.993222	21.25	.997885	.22	.995337	21.45	.004663	21
40	8.994497	21.18	9.997872	.20	8.996624	21.40	1.003376	20
41	.995768	21.13	.997860	.22	.997908	21.33	.002092	19
42	.997036	21.05	.997847	.20	.999188	21.28	.000812	18
43	.998299	21.02	.997835	.22	9.000465	21.22	0.999535	17
44	.999560	20.93	.997822	.22	.001738	21.15	.998262	16
45	9.000816	20.88	9.997809	.20	9.003007	21.08	0.996993	15
46	.002069	20.82	.997797	.22	.004272	21.03	.995728	14
47	.003318	20.75	.997784	.22	.005534	20.97	.994466	13
48	.004563	20.70	.997771	.22	.006792	20.92	.993208	12
49	.005805	20.65	.997758	.22	.008047	20.85	.991953	11
50	9.007044	20.57	9.997745	.22	9.009298	20.80	0.990702	10
51	.008278	20.53	.997732	.22	.010546	20.73	.989454	9
52	.009510	20.45	.997719	.22	.011790	20.68	.988210	8
53	.010737	20.42	.997706	.22	.013031	20.62	.986969	7
54	.011962	20.33	.997693	.22	.014268	20.57	.985732	6
55	9.013182	20.30	9.997680	.22	9.015502	20.50	0.984498	5
56	.014400	20.22	.997667	.22	.016732	20.45	.983268	4
57	.015613	20.18	.997654	.22	.017959	20.40	.982041	3
58	.016824	20.12	.997641	.22	.019183	20.33	.980817	2
59	.018031	20.07	.997628	.23	.020403	20.28	.979597	1
60	9.019235		9.997614		9.021620		0.978380	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

95° 84°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.019235	20.00	9.997614	.22	9.021620	20.23	0.978380	60
1	.020435	19.95	.997601	.22	.022834	20.17	.977166	59
2	.021632	19.88	.997588	.23	.024044	20.12	.975956	58
3	.022825	19.85	.997574	.22	.025251	20.07	.974749	57
4	.024016	19.78	.997561	.23	.026455	20.00	.973545	56
5	9.025203	19.72	9.997547	.22	9.027655	19.95	0.972345	55
6	.026386	19.68	.997534	.23	.028852	19.90	.971148	54
7	.027567	19.62	.997520	.22	.030046	19.85	.969954	53
8	.028744	19.57	.997507	.23	.031237	19.80	.968763	52
9	.029918	19.52	.997493	.22	.032425	19.73	.967575	51
10	9.031089	19.47	9.997480	.23	9.033609	19.70	0.966391	50
11	.032257	19.40	.997466	.23	.034791	19.63	.965209	49
12	.033421	19.35	.997452	.22	.035969	19.58	.964031	48
13	.034582	19.32	.997439	.23	.037144	19.53	.962856	47
14	.035741	19.25	.997425	.23	.038316	19.48	.961684	46
15	9.036896	19.20	9.997411	.23	9.039485	19.43	0.960515	45
16	.038048	19.15	.997397	.23	.040651	19.37	.959349	44
17	.039197	19.08	.997383	.23	.041813	19.33	.958187	43
18	.040342	19.05	.997369	.23	.042973	19.28	.957027	42
19	.041485	19.00	.997355	.23	.044130	19.23	.955870	41
20	9.042625	18.95	9.997341	.23	9.045284	19.17	0.954716	40
21	.043762	18.88	.997327	.23	.046434	19.13	.953566	39
22	.044895	18.85	.997313	.23	.047582	19.08	.952418	38
23	.046026	18.80	.997299	.23	.048727	19.03	.951273	37
24	.047154	18.75	.997285	.23	.049869	18.98	.950131	36
25	9.048279	18.68	9.997271	.23	9.051008	18.93	0.948992	35
26	.049400	18.65	.997257	.25	.052144	18.88	.947856	34
27	.050519	18.60	.997242	.23	.053277	18.83	.946723	33
28	.051635	18.57	.997228	.23	.054407	18.80	.945593	32
29	.052749	18.50	.997214	.25	.055535	18.73	.944465	31
30	9.053859	18.45	9.997199	.23	9.056659	18.70	0.943341	30
31	.054966	18.42	.997185	.25	.057781	18.65	.942219	29
32	.056071	18.35	.997170	.23	.058900	18.60	.941100	28
33	.057172	18.32	.997156	.25	.060016	18.57	.939984	27
34	.058271	18.27	.997141	.23	.061130	18.50	.938870	26
35	9.059367	18.22	9.997127	.25	9.062240	18.47	0.937760	25
36	.060460	18.18	.997112	.23	.063348	18.42	.936652	24
37	.061551	18.13	.997098	.25	.064453	18.38	.935547	23
38	.062639	18.08	.997083	.25	.065556	18.32	.934444	22
39	.063724	18.03	.997068	.25	.066655	18.28	.933345	21
40	9.064806	17.98	9.997053	.23	9.067752	18.23	0.932248	20
41	.065885	17.95	.997039	.25	.068846	18.20	.931154	19
42	.066962	17.90	.997024	.25	.069938	18.15	.930062	18
43	.068036	17.85	.997009	.25	.071027	18.10	.928973	17
44	.069107	17.82	.996994	.25	.072113	18.07	.927887	16
45	9.070176	17.77	9.996979	.25	9.073197	18.02	0.926803	15
46	.071242	17.73	.996964	.25	.074278	17.97	.925722	14
47	.072306	17.67	.996949	.25	.075356	17.93	.924644	13
48	.073366	17.63	.996934	.25	.076432	17.88	.923568	12
49	.074424	17.60	.996919	.25	.077505	17.85	.922495	11
50	9.075480	17.55	9.996904	.25	9.078576	17.80	0.921424	10
51	.076533	17.50	.996889	.25	.079644	17.77	.920356	9
52	.077583	17.47	.996874	.27	.080710	17.72	.919290	8
53	.078631	17.42	.996858	.25	.081773	17.67	.918227	7
54	.079676	17.38	.996843	.25	.082833	17.63	.917167	6
55	9.080719	17.33	9.996828	.27	9.083891	17.60	0.916109	5
56	.081759	17.30	.996812	.25	.084947	17.55	.915053	4
57	.082797	17.25	.996797	.25	.086000	17.50	.914000	3
58	.083832	17.20	.996782	.27	.087050	17.47	.912950	2
59	.084864	17.17	.996766	.25	.088098	17.43	.911902	1
60	9.085894		9.996751		9.089144		0.910856	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
1000	000000	0043	0087	0130	0174	0217	0260	0304	0347	0391	43
1001	0434	0477	0521	0564	0608	0651	0694	0738	0781	0824	43
1002	0868	0911	0954	0998	1041	1084	1128	1171	1214	1258	43
1003	1301	1344	1388	1431	1474	1517	1561	1604	1647	1690	43
1004	1734	1777	1820	1863	1907	1950	1993	2036	2080	2123	43
1005	002166	2209	2252	2296	2339	2382	2425	2468	2512	2555	43
1006	2598	2641	2684	2727	2771	2814	2857	2900	2943	2986	43
1007	3029	3073	3116	3159	3202	3245	3288	3331	3374	3417	43
1008	3461	3504	3547	3590	3633	3676	3719	3762	3805	3848	43
1009	3891	3934	3977	4020	4063	4106	4149	4192	4235	4278	43
1010	004321	4364	4407	4450	4493	4536	4579	4622	4665	4708	43
1011	4751	4794	4837	4880	4923	4966	5009	5052	5095	5138	43
1012	5181	5223	5266	5309	5352	5395	5438	5481	5524	5567	43
1013	5609	5652	5695	5738	5781	5824	5867	5909	5952	5995	43
1014	6038	6081	6124	6166	6209	6252	6295	6338	6380	6423	43
1015	006466	6509	6552	6594	6637	6680	6723	6765	6808	6851	43
1016	6894	6936	6979	7022	7065	7107	7150	7193	7236	7278	43
1017	7321	7364	7406	7449	7492	7534	7577	7620	7662	7705	43
1018	7748	7790	7833	7876	7918	7961	8004	8046	8089	8132	43
1019	8174	8217	8259	8302	8345	8387	8430	8472	8515	8558	43
1020	008600	8643	8685	8728	8770	8813	8856	8898	8941	8983	43
1021	9026	9068	9111	9153	9196	9238	9281	9323	9366	9408	42
1022	9451	9493	9536	9578	9621	9663	9706	9748	9791	9833	42
1023	9876	9918	9961	*0003	*0045	*0088	*0130	*0173	*0215	*0258	42
1024	010300	0342	0385	0427	0470	0512	0554	0597	0639	0681	42
1025	010724	0766	0809	0851	0893	0936	0978	1020	1063	1105	42
1026	1147	1190	1232	1274	1317	1359	1401	1444	1486	1528	42
1027	1570	1613	1655	1697	1740	1782	1824	1866	1909	1951	42
1028	1993	2035	2078	2120	2162	2204	2247	2289	2331	2373	42
1029	2415	2458	2500	2542	2584	2626	2669	2711	2753	2795	42
1030	012837	2879	2922	2964	3006	3048	3090	3132	3174	3217	42
1031	3259	3301	3343	3385	3427	3469	3511	3553	3596	3638	42
1032	3680	3722	3764	3806	3848	3890	3932	3974	4016	4058	42
1033	4100	4142	4184	4226	4268	4310	4353	4395	4437	4479	42
1034	4521	4563	4605	4647	4689	4730	4772	4814	4856	4898	42
1035	014940	4982	5024	5066	5108	5150	5192	5234	5276	5318	42
1036	5360	5402	5444	5485	5527	5569	5611	5653	5695	5737	42
1037	5779	5821	5863	5904	5946	5988	6030	6072	6114	6156	42
1038	6197	6239	6281	6323	6365	6407	6448	6490	6532	6574	42
1039	6616	6657	6699	6741	6783	6824	6866	6908	6950	6992	42
1040	017033	7075	7117	7159	7200	7242	7284	7326	7367	7409	42
1041	7451	7492	7534	7576	7618	7659	7701	7743	7784	7826	42
1042	7868	7909	7951	7993	8034	8076	8118	8159	8201	8243	42
1043	8284	8326	8368	8409	8451	8492	8534	8576	8617	8659	42
1044	8700	8742	8784	8825	8867	8908	8950	8992	9033	9075	42
1045	019116	9158	9199	9241	9282	9324	9366	9407	9449	9490	42
1046	9532	9573	9615	9656	9698	9739	9781	9822	9864	9905	41
1047	9947	9988	*0030	*0071	*0113	*0154	*0195	*0237	*0278	*0320	41
1048	020361	0403	0444	0486	0527	0568	0610	0651	0693	0734	41
1049	0775	0817	0858	0900	0941	0982	1024	1065	1107	1148	41
1050	021189	1231	1272	1313	1355	1396	1437	1479	1520	1561	41

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR.PTS.	44	4	9	13	18	22	26	31	35	40	44
	43	4	9	13	17	22	26	30	34	39	43
	42	4	8	13	17	21	25	29	34	38	42
	41	4	8	12	16	21	25	29	33	37	41
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	— ∞		10.000000		— ∞		— ∞	60
1	6.463726	5017.17	.000000	.00	6.463726	5017.17	3.536274	59
2	.764756	2934.85	.000000	.00	.764756	2934.85	.235244	58
3	.940847	2082.32	.000000	.00	.940847	2082.32	.059153	57
4	7.065786	1615.17	.000000	.00	7.065786	1615.17	2.934214	56
5	7.162696	1319.68	10.000000	.02	7.162696	1319.70	2.837304	55
6	.241877	1115.78	9.999999	.00	.241878	1115.78	.758122	54
7	.308824	966.53	.999999	.00	.308825	966.53	.691175	53
8	.366816	852.53	.999999	.00	.366817	852.55	.633183	52
9	.417968	762.63	.999999	.02	.417970	762.62	.582030	51
10	7.463726	689.87	9.999998	.00	7.463727	689.88	2.536273	50
11	.505118	629.80	.999998	.02	.505120	629.82	.494880	49
12	.542906	579.37	.999997	.00	.542909	579.38	.457091	48
13	.577668	536.42	.999997	.02	.577672	536.42	.422328	47
14	.609853	499.38	.999996	.00	.609857	499.38	.390143	46
15	7.639816	467.15	9.999996	.02	7.639820	467.15	2.360180	45
16	.667845	438.80	.999995	.00	.667849	438.83	.332151	44
17	.694173	413.73	.999995	.02	.694179	413.73	.305821	43
18	.718997	391.35	.999994	.02	.719003	391.35	.280997	42
19	.742478	371.27	.999993	.00	.742484	371.28	.257516	41
20	7.764754	353.15	9.999993	.02	7.764761	353.17	2.235239	40
21	.785943	336.72	.999992	.02	.785951	336.73	.214049	39
22	.806146	321.75	.999991	.02	.806155	321.75	.193845	38
23	.825451	308.05	.999990	.02	.825460	308.07	.174540	37
24	.843934	295.47	.999989	.00	.843944	295.50	.156056	36
25	7.861662	283.88	9.999989	.02	7.861674	283.90	2.138326	35
26	.878695	273.17	.999988	.02	.878708	273.18	.121292	34
27	.895085	263.23	.999987	.02	.895099	263.25	.104901	33
28	.910879	254.00	.999986	.02	.910894	254.00	.089106	32
29	.926119	245.38	.999985	.03	.926134	245.40	.073866	31
30	7.940842	237.33	9.999983	.02	7.940858	237.37	2.059142	30
31	.955082	229.80	.999982	.02	.955100	229.82	.044900	29
32	.968870	222.72	.999981	.02	.968889	222.73	.031111	28
33	.982233	216.08	.999980	.02	.982253	216.10	.017747	27
34	.995198	209.82	.999979	.03	.995219	209.83	.004781	26
35	8.007787	203.90	9.999977	.02	8.007809	203.92	1.992191	25
36	.020021	198.30	.999976	.02	.020044	198.35	.979956	24
37	.031919	193.03	.999975	.03	.031945	193.03	.968055	23
38	.043501	188.00	.999973	.02	.043527	188.03	.956473	22
39	.054781	183.25	.999972	.02	.054809	183.28	.945191	21
40	8.065776	178.73	9.999971	.03	8.065806	178.75	1.934194	20
41	.076500	174.42	.999969	.02	.076531	174.43	.923469	19
42	.086965	170.30	.999968	.03	.086997	170.33	.913003	18
43	.097183	166.40	.999966	.03	.097217	166.43	.902783	17
44	.107167	162.65	.999964	.02	.107203	162.67	.892797	16
45	8.116926	159.08	9.999963	.03	8.116963	159.12	1.883037	15
46	.126471	155.65	.999961	.03	.126510	155.68	.873490	14
47	.135810	152.38	.999959	.02	.135851	152.42	.864149	13
48	.144953	149.23	.999958	.03	.144996	149.27	.855004	12
49	.153907	146.23	.999956	.03	.153952	146.25	.846048	11
50	8.162681	143.32	9.999954	.03	8.162727	143.35	1.837273	10
51	.171280	140.55	.999952	.03	.171328	140.58	.828672	9
52	.179713	137.87	.999950	.03	.179763	137.88	.820237	8
53	.187985	135.28	.999948	.03	.188036	135.33	.811964	7
54	.196102	132.80	.999946	.03	.196156	132.83	.803844	6
55	8.204070	130.42	9.999944	.03	8.204126	130.45	1.795874	5
56	.211895	128.10	.999942	.03	.211953	128.13	.788047	4
57	.219581	125.88	.999940	.03	219641	125.90	.780359	3
58	.227134	123.72	.999938	.03	.227195	123.77	.772805	2
59	.234557	121.63	.999936	.03	.234621	121.67	.765379	1
60	8.241855		9.999934		8.241921		1.758079	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

TABLE XII.—LOGARITHMS OF NUMBERS.

N.	0	1	2	3	4	5	6	7	8	9	Diff.
1000	000000	0043	0087	0130	0174	0217	0260	0304	0347	0391	43
1001	0434	0477	0521	0564	0608	0651	0694	0738	0781	0824	43
1002	0868	0911	0954	0998	1041	1084	1128	1171	1214	1258	43
1003	1301	1344	1388	1431	1474	1517	1561	1604	1647	1690	43
1004	1734	1777	1820	1863	1907	1950	1993	2036	2080	2123	43
1005	002166	2209	2252	2296	2339	2382	2425	2468	2512	2555	43
1006	2598	2641	2684	2727	2771	2814	2857	2900	2943	2986	43
1007	3029	3073	3116	3159	3202	3245	3288	3331	3374	3417	43
1008	3461	3504	3547	3590	3633	3676	3719	3762	3805	3848	43
1009	3891	3934	3977	4020	4063	4106	4149	4192	4235	4278	43
1010	004321	4364	4407	4450	4493	4536	4579	4622	4665	4708	43
1011	4751	4794	4837	4880	4923	4966	5009	5052	5095	5138	43
1012	5181	5223	5266	5309	5352	5395	5438	5481	5524	5567	43
1013	5609	5652	5695	5738	5781	5824	5867	5909	5952	5995	43
1014	6038	6081	6124	6166	6209	6252	6295	6338	6380	6423	43
1015	006466	6509	6552	6594	6637	6680	6723	6765	6808	6851	43
1016	6894	6936	6979	7022	7065	7107	7150	7193	7236	7278	43
1017	7321	7364	7406	7449	7492	7534	7577	7620	7662	7705	43
1018	7748	7790	7833	7876	7918	7961	8004	8046	8089	8132	43
1019	8174	8217	8259	8302	8345	8387	8430	8472	8515	8558	43
1020	008600	8643	8685	8728	8770	8813	8856	8898	8941	8983	43
1021	9026	9068	9111	9153	9196	9238	9281	9323	9366	9408	42
1022	9451	9493	9536	9578	9621	9663	9706	9748	9791	9833	42
1023	9876	9918	9961	*0003	*0045	*0088	*0130	*0173	*0215	*0258	42
1024	010300	0342	0385	0427	0470	0512	0554	0597	0639	0681	42
1025	010724	0766	0809	0851	0893	0936	0978	1020	1063	1105	42
1026	1147	1190	1232	1274	1317	1359	1401	1444	1486	1528	42
1027	1570	1613	1655	1697	1740	1782	1824	1866	1909	1951	42
1028	1993	2035	2078	2120	2162	2204	2247	2289	2331	2373	42
1029	2415	2458	2500	2542	2584	2626	2669	2711	2753	2795	42
1030	012837	2879	2922	2964	3006	3048	3090	3132	3174	3217	42
1031	3259	3301	3343	3385	3427	3469	3511	3553	3596	3638	42
1032	3680	3722	3764	3806	3848	3890	3932	3974	4016	4058	42
1033	4100	4142	4184	4226	4268	4310	4353	4395	4437	4479	42
1034	4521	4563	4605	4647	4689	4730	4772	4814	4856	4898	42
1035	014940	4982	5024	5066	5108	5150	5192	5234	5276	5318	42
1036	5360	5402	5444	5485	5527	5569	5611	5653	5695	5737	42
1037	5779	5821	5863	5904	5946	5988	6030	6072	6114	6156	42
1038	6197	6239	6281	6323	6365	6407	6448	6490	6532	6574	42
1039	6616	6657	6699	6741	6783	6824	6866	6908	6950	6992	42
1040	017033	7075	7117	7159	7200	7242	7284	7326	7367	7409	42
1041	7451	7492	7534	7576	7618	7659	7701	7743	7784	7826	42
1042	7868	7909	7951	7993	8034	8076	8118	8159	8201	8243	42
1043	8284	8326	8368	8409	8451	8492	8534	8576	8617	8659	42
1044	8700	8742	8784	8825	8867	8908	8950	8992	9033	9075	42
1045	019116	9158	9199	9241	9282	9324	9366	9407	9449	9490	42
1046	9532	9573	9615	9656	9698	9739	9781	9822	9864	9905	41
1047	9947	9988	*0030	*0071	*0113	*0154	*0195	*0237	*0278	*0320	41
1048	020361	0403	0444	0486	0527	0568	0610	0651	0693	0734	41
1049	0775	0817	0858	0900	0941	0982	1024	1065	1107	1148	41
1050	021189	1231	1272	1313	1355	1396	1437	1479	1520	1561	41

N.	Diff.	1	2	3	4	5	6	7	8	9	Diff.
PR.PTS.	44	4	9	13	18	22	26	31	35	40	44
	43	4	9	13	17	22	26	30	34	39	43
	42	4	8	13	17	21	25	29	34	38	42
	41	4	8	12	16	21	25	29	33	37	41
	Diff.	1	2	3	4	5	6	7	8	9	Diff.

TABLE XIII.—LOGARITHMIC SIN., COS., TAN. AND COT.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	— ∞		10.000000		— ∞		— ∞	60
1	6.463726	5017.17	.000000	.00	6.463726	5017.17	3.536274	59
2	.764756	2934.85	.000000	.00	.764756	2934.85	.235244	58
3	.940847	2082.32	.000000	.00	.940847	2082.32	.059153	57
4	7.065786	1615.17	.000000	.00	7.065786	1615.17	2.934214	56
5	7.162696	1319.68	10.000000	.02	7.162696	1319.70	2.837304	55
6	.241877	1115.78	9.999999	.00	.241878	1115.78	.758122	54
7	.308824	966.53	.999999	.00	.308825	966.53	.691175	53
8	.366816	852.53	.999999	.00	.366817	852.55	.633183	52
9	.417968	762.63	.999999	.02	.417970	762.62	.582030	51
10	7.463726	689.87	9.999998	.00	7.463727	689.88	2.536273	50
11	.505118	629.80	.999998	.02	.505120	629.82	.494880	49
12	.542906	579.37	.999997	.00	.542909	579.38	.457091	48
13	.577668	536.42	.999997	.02	.577672	536.42	.422328	47
14	.609853	499.38	.999996	.00	.609857	499.38	.390143	46
15	7.639816	467.15	9.999996	.02	7.639820	467.15	2.360180	45
16	.667845	438.80	.999995	.00	.667849	438.83	.332151	44
17	.694173	413.73	.999995	.02	.694179	413.73	.305821	43
18	.718997	391.35	.999994	.02	.719003	391.35	.280997	42
19	.742478	371.27	.999993	.00	.742484	371.28	.257516	41
20	7.764754	353.15	9.999993	.02	7.764761	353.17	2.235239	40
21	.785943	336.72	.999992	.02	.785951	336.73	.214049	39
22	.806146	321.75	.999991	.02	.806155	321.75	.193845	38
23	.825451	308.05	.999990	.02	.825460	308.07	.174540	37
24	.843934	295.47	.999989	.00	.843944	295.50	.156056	36
25	7.861662	283.88	9.999989	.02	7.861674	283.90	2.138326	35
26	.878695	273.17	.999988	.02	.878708	273.18	.121292	34
27	.895085	263.23	.999987	.02	.895099	263.25	.104901	33
28	.910879	254.00	.999986	.02	.910894	254.00	.089106	32
29	.926119	245.38	.999985	.03	.926134	245.40	.073866	31
30	7.940842	237.33	9.999983	.02	7.940858	237.37	2.059142	30
31	.955082	229.80	.999982	.02	.955100	229.82	.044900	29
32	.968870	222.72	.999981	.02	.968889	222.73	.031111	28
33	.982233	216.08	.999980	.02	.982253	216.10	.017747	27
34	.995198	209.82	.999979	.03	.995219	209.83	.004781	26
35	8.007787	203.90	9.999977	.02	8.007809	203.92	1.992191	25
36	.020021	198.30	.999976	.02	.020044	198.35	.979956	24
37	.031919	193.03	.999975	.03	.031945	193.03	.968055	23
38	.043501	188.00	.999973	.02	.043527	188.03	.956473	22
39	.054781	183.25	.999972	.02	.054809	183.28	.945191	21
40	8.065776	178.73	9.999971	.03	8.065806	178.75	1.934194	20
41	.076500	174.42	.999969	.02	.076531	174.43	.923469	19
42	.086965	170.30	.999968	.03	.086997	170.33	.913003	18
43	.097183	166.40	.999966	.03	.097217	166.43	.902783	17
44	.107167	162.65	.999964	.02	.107203	162.67	.892797	16
45	8.116926	159.08	9.999963	.03	8.116963	159.12	1.883037	15
46	.126471	155.65	.999961	.03	.126510	155.68	.873490	14
47	.135810	152.38	.999959	.02	.135851	152.42	.864149	13
48	.144953	149.23	.999958	.03	.144996	149.27	.855004	12
49	.153907	146.23	.999956	.03	.153952	146.25	.846048	11
50	8.162681	143.32	9.999954	.03	8.162727	143.35	1.837273	10
51	.171280	140.55	.999952	.03	.171328	140.58	.828672	9
52	.179713	137.87	.999950	.03	.179763	137.88	.820237	8
53	.187985	135.28	.999948	.03	.188036	135.33	.811964	7
54	.196102	132.80	.999946	.03	.196156	132.83	.803844	6
55	8.204070	130.42	9.999944	.03	8.204126	130.45	1.795874	5
56	.211895	128.10	.999942	.03	.211953	128.13	.788047	4
57	.219581	125.88	.999940	.03	219641	125.90	.780359	3
58	.227134	123.72	.999938	.03	.227195	123.77	.772805	2
59	.234557	121.63	.999936	.03	.234621	121.67	.765379	1
60	8.241855		9.999934		8.241921		1.758079	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.241855	119.63	9.999934	.03	8.241921	119.68	1.758079	60
1	.249033	117.68	.999932	.05	.249102	117.72	.750898	59
2	.256094	115.80	.999929	.03	.256165	115.83	.743835	58
3	.263042	113.98	.999927	.03	.263115	114.02	.736885	57
4	.269881	112.22	.999925	.05	.269956	112.25	.730044	56
5	8.276614	110.48	9.999922	.03	8.276691	110.53	1.723309	55
6	.283243	108.83	.999920	.03	.283323	108.88	.716677	54
7	.289773	107.23	.999918	.05	.289856	107.27	.710144	53
8	.296207	105.65	.999915	.03	.296292	105.70	.703708	52
9	.302546	104.13	.999913	.05	.302634	104.17	.697366	51
10	8.308794	102.67	9.999910	.05	8.308884	102.70	1.691116	50
11	.314954	101.22	.999907	.03	.315046	101.27	.684954	49
12	.321027	99.82	.999905	.05	.321122	99.87	.678878	48
13	.327016	98.47	.999902	.05	.327114	98.52	.672886	47
14	.332924	97.15	.999899	.03	.333025	97.18	.666975	46
15	8.338753	95.85	9.999897	.05	8.338856	95.90	1.661144	45
16	.344504	94.62	.999894	.05	.344610	94.65	.655390	44
17	.350181	93.37	.999891	.05	.350289	93.43	.649711	43
18	.355783	92.20	.999888	.05	.355895	92.25	.644105	42
19	.361315	91.03	.999885	.05	.361430	91.08	.638570	41
20	8.366777	89.90	9.999882	.05	8.366895	89.95	1.633105	40
21	.372171	88.80	.999879	.05	.372292	88.83	.627708	39
22	.377499	87.72	.999876	.05	.377622	87.78	.622378	38
23	.382762	86.67	.999873	.05	.382889	86.72	.617111	37
24	.387962	85.65	.999870	.05	.388092	85.70	.611908	36
25	8.393101	84.63	9.999867	.05	8.393234	84.68	1.606766	35
26	.398179	83.67	.999864	.05	.398315	83.72	.601685	34
27	.403199	82.70	.999861	.05	.403338	82.77	.596662	33
28	.408161	81.78	.999858	.07	.408304	81.82	.591696	32
29	.413068	80.85	.999854	.05	.413213	80.92	.586787	31
30	8.417919	79.97	9.999851	.05	8.418068	80.02	1.581932	30
31	.422717	79.08	.999848	.07	.422869	79.15	.577131	29
32	.427462	78.23	.999844	.05	.427618	78.28	.572382	28
33	.432156	77.40	.999841	.05	.432315	77.45	.567685	27
34	.436800	76.57	.999838	.07	.436962	76.63	.563038	26
35	8.441394	75.78	9.999834	.05	8.441560	75.83	1.558440	25
36	.445941	74.98	.999831	.07	.446110	75.05	.553890	24
37	.450440	74.22	.999827	.05	.450613	74.28	.549387	23
38	.454893	73.47	.999824	.07	.455070	73.52	.544930	22
39	.459301	72.73	.999820	.07	.459481	72.80	.540519	21
40	8.463665	72.00	9.999816	.05	8.463849	72.05	1.536151	20
41	.467985	71.30	.999813	.07	.468172	71.37	.531828	19
42	.472263	70.58	.999809	.07	.472454	70.65	.527546	18
43	.476498	69.92	.999805	.07	.476693	69.98	.523307	17
44	.480693	69.25	.999801	.07	.480892	69.30	.519108	16
45	8.484848	68.58	9.999797	.05	8.485050	68.67	1.514950	15
46	.488963	67.95	.999794	.07	.489170	68.00	.510830	14
47	.493040	67.30	.999790	.07	.493250	67.38	.506750	13
48	.497078	66.70	.999786	.07	.497293	66.75	.502707	12
49	.501080	66.08	.999782	.07	.501298	66.15	.498702	11
50	8.505045	65.48	9.999778	.07	8.505267	65.55	1.494733	10
51	.508974	64.88	.999774	.08	.509200	64.97	.490800	9
52	.512867	64.32	.999769	.07	.513098	64.38	.486902	8
53	.516726	63.75	.999765	.07	.516961	63.82	.483039	7
54	.520551	63.20	.999761	.07	.520790	63.27	.479210	6
55	8.524343	62.65	9.999757	.07	8.524586	62.72	1.475414	5
56	.528102	62.10	.999753	.08	.528349	62.18	.471651	4
57	.531828	61.58	.999748	.07	.532080	61.65	.467920	3
58	.535523	61.05	.999744	.07	.535779	61.13	.464221	2
59	.539186	60.55	.999740	.08	.539447	60.62	.460553	1
60	8.542819		9.999735		8.543084		1.456916	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

2°

177°

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	8.542819	60.05	9.999735	.07	8.543084	60.12	1.456916	60
1	.546422	59.55	.999731	.08	.546691	59.62	.453309	59
2	.549995	59.07	.999726	.07	.550268	59.15	.449732	58
3	.553539	58.58	.999722	.08	.553817	58.65	.446183	57
4	.557054	58.10	.999717	.07	.557336	58.20	.442664	56
5	8.560540	57.65	9.999713	.08	8.560828	57.72	1.439172	55
6	.563999	57.20	.999708	.07	.564291	57.27	.435709	54
7	.567431	56.75	.999704	.08	.567727	56.83	.432273	53
8	.570836	56.30	.999699	.08	.571137	56.38	.428863	52
9	.574214	55.87	.999694	.08	.574520	55.95	.425480	51
10	8.577566	55.43	9.999689	.07	8.577877	55.52	1.422123	50
11	.580892	55.02	.999685	.08	.581208	55.10	.418792	49
12	.584193	54.60	.999680	.08	.584514	54.68	.415486	48
13	.587469	54.20	.999675	.08	.587795	54.27	.412205	47
14	.590721	53.78	.999670	.08	.591051	53.87	.408949	46
15	8.593948	53.40	9.999665	.08	8.594283	53.48	1.405717	45
16	.597152	53.00	.999660	.08	.597492	53.08	.402508	44
17	.600332	52.62	.999655	.08	.600677	52.70	.399323	43
18	.603489	52.23	.999650	.08	.603839	52.32	.396161	42
19	.606623	51.85	.999645	.08	.606978	51.93	.393022	41
20	8.609734	51.48	9.999640	.08	8.610094	51.58	1.389906	40
21	.612823	51.13	.999635	.10	.613189	51.22	.386811	39
22	.615891	50.77	.999629	.08	.616262	50.85	.383738	38
23	.618937	50.42	.999624	.08	.619313	50.50	.380687	37
24	.621962	50.05	.999619	.08	.622343	50.15	.377657	36
25	8.624965	49.72	9.999614	.10	8.625352	49.80	1.374648	35
26	.627948	49.38	.999608	.08	.628340	49.47	.371660	34
27	.630911	49.05	.999603	.10	.631308	49.13	.368692	33
28	.633854	48.70	.999597	.08	.634256	48.80	.365744	32
29	.636776	48.40	.999592	.10	.637184	48.48	.362816	31
30	8.639680	48.05	9.999586	.08	8.640093	48.15	1.359907	30
31	.642563	47.75	.999581	.10	.642982	47.85	.357018	29
32	.645428	47.43	.999575	.08	.645853	47.52	.354147	28
33	.648274	47.13	.999570	.10	.648704	47.22	.351296	27
34	.651102	46.82	.999564	.10	.651537	46.92	.348463	26
35	8.653911	46.52	9.999558	.08	8.654352	46.62	1.345648	25
36	.656702	46.22	.999553	.10	.657149	46.32	.342851	24
37	.659475	45.92	.999547	.10	.659928	46.02	.340072	23
38	.662230	45.63	.999541	.10	.662689	45.73	.337311	22
39	.664968	45.35	.999535	.10	.665433	45.45	.334567	21
40	8.667689	45.07	9.999529	.08	8.668160	45.17	1.331840	20
41	.670393	44.78	.999524	.10	.670870	44.88	.329130	19
42	.673080	44.52	.999518	.10	.673563	44.60	.326437	18
43	.675751	44.23	.999512	.10	.676239	44.35	.323761	17
44	.678405	43.97	.999506	.10	.678900	44.07	.321100	16
45	8.681043	43.70	9.999500	.12	8.681544	43.80	1.318456	15
46	.683665	43.45	.999493	.10	.684172	43.53	.315828	14
47	.686272	43.18	.999487	.10	.686784	43.28	.313216	13
48	.688863	42.92	.999481	.10	.689381	43.03	.310619	12
49	.691438	42.67	.999475	.10	.691963	42.77	.308037	11
50	8.693998	42.42	9.999469	.10	8.694529	42.53	1.305471	10
51	.696543	42.17	.999463	.12	.697081	42.27	.302919	9
52	.699073	41.93	.999456	.10	.699617	42.03	.300383	8
53	.701589	41.68	.999450	.12	.702139	41.78	.297861	7
54	.704090	41.45	.999443	.10	.704646	41.57	.295354	6
55	8.706577	41.20	9.999437	.10	8.707140	41.30	1.292860	5
56	.709049	40.97	.999431	.12	.709618	41.08	.290382	4
57	.711507	40.75	.999424	.10	.712083	40.85	.287917	3
58	.713952	40.52	.999418	.12	.714534	40.63	.285466	2
59	.716383	40.28	.999411	.12	.716972	40.40	.283028	1
60	8.718800		9.999404		8.719396		1.280604	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

92°

87°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.718800	40.07	9.999404	.10	8.719396	40.17	1.280604	60
1	.721204	39.85	.999398	.12	.721806	39.97	.278194	59
2	.723595	39.62	.999391	.12	.724204	39.73	.275796	58
3	.725972	39.42	.999384	.10	.726588	39.52	.273412	57
4	.728337	39.18	.999378	.12	.728959	39.30	.271041	56
5	8.730688	38.98	9.999371	.12	8.731317	39.10	1.268683	55
6	.733027	38.78	.999364	.12	.733663	38.88	.266337	54
7	.735354	38.55	.999357	.12	.735996	38.68	.264004	53
8	.737667	38.37	.999350	.12	.738317	38.48	.261683	52
9	.739969	38.17	.999343	.12	.740626	38.27	.259374	51
10	8.742259	37.95	9.999336	.12	8.742922	38.08	1.257078	50
11	.744536	37.77	.999329	.12	.745207	37.87	.254793	49
12	.746802	37.55	.999322	.12	.747479	37.68	.252521	48
13	.749055	37.37	.999315	.12	.749740	37.48	.250260	47
14	.751297	37.18	.999308	.12	.751989	37.30	.248011	46
15	8.753528	36.98	9.999301	.12	8.754227	37.10	1.245773	45
16	.755747	36.80	.999294	.12	.756453	36.92	.243547	44
17	.757955	36.60	.999287	.13	.758668	36.73	.241332	43
18	.760151	36.43	.999279	.12	.760872	36.55	.239128	42
19	.762337	36.23	.999272	.12	.763065	36.35	.236935	41
20	8.764511	36.07	9.999265	.13	8.765246	36.18	1.234754	40
21	.766675	35.88	.999257	.12	.767417	36.02	.232583	39
22	.768828	35.70	.999250	.13	.769578	35.82	.230422	38
23	.770970	35.52	.999242	.12	.771727	35.65	.228273	37
24	.773101	35.37	.999235	.13	.773866	35.48	.226134	36
25	8.775223	35.17	9.999227	.12	8.775995	35.32	1.224005	35
26	.777333	35.02	.999220	.13	.778114	35.13	.221886	34
27	.779434	34.83	.999212	.12	.780222	34.97	.219778	33
28	.781524	34.68	.999205	.13	.782320	34.80	.217680	32
29	.783605	34.50	.999197	.13	.784408	34.63	.215592	31
30	8.785675	34.35	9.999189	.13	8.786486	34.47	1.213514	30
31	.787736	34.18	.999181	.12	.788554	34.32	.211446	29
32	.789787	34.02	.999174	.13	.790613	34.15	.209387	28
33	.791828	33.85	.999166	.13	.792662	33.98	.207338	27
34	.793859	33.70	.999158	.13	.794701	33.83	.205299	26
35	8.795881	33.55	9.999150	.13	8.796731	33.68	1.203269	25
36	.797894	33.38	.999142	.13	.798752	33.52	.201248	24
37	.799897	33.25	.999134	.13	.800763	33.37	.199237	23
38	.801892	33.07	.999126	.13	.802765	33.22	.197235	22
39	.803876	32.93	.999118	.13	.804758	33.07	.195242	21
40	8.805852	32.78	9.999110	.13	8.806742	32.92	1.193258	20
41	.807819	32.63	.999102	.13	.808717	32.77	.191283	19
42	.809777	32.48	.999094	.13	.810683	32.63	.189317	18
43	.811726	32.35	.999086	.15	.812641	32.47	.187359	17
44	.813667	32.20	.999077	.13	.814589	32.33	.185411	16
45	8.815599	32.05	9.999069	.13	8.816529	32.20	1.183471	15
46	.817522	31.90	.999061	.13	.818461	32.05	.181539	14
47	.819436	31.78	.999053	.15	.820384	31.90	.179616	13
48	.821343	31.62	.999044	.13	.822298	31.78	.177702	12
49	.823240	31.50	.999036	.15	.824205	31.63	.175795	11
50	8.825130	31.35	9.999027	.13	8.826103	31.48	1.173897	10
51	.827011	31.22	.999019	.15	.827992	31.37	.172008	9
52	.828884	31.08	.999010	.13	.829874	31.23	.170126	8
53	.830749	30.97	.999002	.15	.831748	31.08	.168252	7
54	.832607	30.82	.998993	.15	.833613	30.97	.166387	6
55	8.834456	30.68	9.998984	.13	8.835471	30.83	1.164529	5
56	.836297	30.55	.998976	.15	.837321	30.70	.162679	4
57	.838130	30.43	.998967	.15	.839163	30.58	.160837	3
58	.839956	30.30	.998958	.13	.840998	30.45	.159002	2
59	.841774	30.18	.998950	.15	.842825	30.32	.157175	1
60	8.843585		9.998941		8.844644		1.155356	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

93°　86°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.
0	8.843585	30.03	9.998941	.15	8.844644	30.18	1.155356
1	.845387	29.93	.998932	.15	.846455	30.08	.153545
2	.847183	29.80	.998923	.15	.848260	29.95	.151740
3	.848971	29.67	.998914	.15	.850057	29.82	.149943
4	.850751	29.57	.998905	.15	.851846	29.70	.148154
5	8.852525	29.43	9.998896	.15	8.853628	29.58	1.146372
6	.854291	29.30	.998887	.15	.855403	29.47	.144597
7	.856049	29.20	.998878	.15	.857171	29.35	.142829
8	.857801	29.08	.998869	.15	.858932	29.23	.141068
9	.859546	28.95	.998860	.15	.860686	29.12	.139314
10	8.861283	28.85	9.998851	.17	8.862433	29.00	1.137567
11	.863014	28.73	.998841	.15	.864173	28.88	.135827
12	.864738	28.62	.998832	.15	.865906	28.77	.134094
13	.866455	28.50	.998823	.17	.867632	28.65	.132368
14	.868165	28.38	.998813	.15	.869351	28.55	.130649
15	8.869868	28.28	9.998804	.15	8.871064	28.43	1.128936
16	.871565	28.17	.998795	.17	.872770	28.32	.127230
17	.873255	28.05	.998785	.15	.874469	28.22	.125531
18	.874938	27.95	.998776	.17	.876162	28.12	.123838
19	.876615	27.83	.998766	.15	.877849	28.00	.122151
20	8.878285	27.73	9.998757	.17	8.879529	27.88	1.120471
21	.879949	27.63	.998747	.15	.881202	27.78	.118798
22	.881607	27.52	.998738	.17	.882869	27.68	.117131
23	.883258	27.42	.998728	.17	.884530	27.58	.115470
24	.884903	27.32	.998718	.17	.886185	27.47	.113815
25	8.886542	27.20	9.998708	.15	8.887833	27.38	1.112167
26	.888174	27.12	.998699	.17	.889476	27.27	.110524
27	.889801	27.00	.998689	.17	.891112	27.17	.108888
28	.891421	26.90	.998679	.17	.892742	27.07	.107258
29	.893035	26.80	.998669	.17	.894366	26.97	.105634
30	8.894643	26.72	9.998659	.17	8.895984	26.87	1.104016
31	.896246	26.60	.998649	.17	.897596	26.78	.102404
32	.897842	26.50	.998639	.17	.899203	26.67	.100797
33	.899432	26.42	.998629	.17	.900803	26.58	.099197
34	.901017	26.32	.998619	.17	.902398	26.48	.097602
35	8.902596	26.22	9.998609	.17	8.903987	26.38	1.096013
36	.904169	26.12	.998599	.17	.905570	26.28	.094430
37	.905736	26.02	.998589	.18	.907147	26.20	.092853
38	.907297	25.93	.998578	.17	.908719	26.10	.091281
39	.908853	25.85	.998568	.17	.910285	26.02	.089715
40	8.910404	25.75	9.998558	.17	8.911846	25.92	1.088154
41	.911949	25.65	.998548	.18	.913401	25.83	.086599
42	.913488	25.57	.998537	.17	.914951	25.73	.085049
43	.915022	25.47	.998527	.18	.916495	25.65	.083505
44	.916550	25.38	.998516	.17	.918034	25.57	.081966
45	8.918073	25.30	9.998506	.18	8.919568	25.47	1.080432
46	.919591	25.20	.998495	.17	.921096	25.38	.078904
47	.921103	25.12	.998485	.18	.922619	25.28	.077381
48	.922610	25.03	.998474	.17	.924136	25.22	.075864
49	.924112	24.95	.998464	.18	.925649	25.12	.074351
50	8.925609	24.85	9.998453	.18	8.927156	25.03	1.072844
51	.927100	24.78	.998442	.18	.928658	24.95	.071342
52	.928587	24.68	.998431	.17	.930155	24.87	.069845
53	.930068	24.60	.998421	.18	.931647	24.78	.068353
54	.931544	24.52	.998410	.18	.933134	24.70	.066866
55	8.933015	24.43	9.998399	.18	8.934616	24.62	1.065384
56	.934481	24.35	.998388	.18	.936093	24.53	.063907
57	.935942	24.27	.998377	.18	.937565	24.45	.062435
58	.937398	24.20	.998366	.18	.939032	24.37	.060968
59	.938850	24.10	.998355	.18	.940494	24.30	.059506
60	8.940296		9.998344		8.941952		1.058048
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	8.940296	24.03	9.998344	.18	8.941952	24.20	1.058048	60
1	.941738	23.93	.998333	.18	.943404	24.13	.056596	59
2	.943174	23.87	.998322	.18	.944852	24.05	.055148	58
3	.944606	23.80	.998311	.18	.946295	23.98	.053705	57
4	.946034	23.70	.998300	.18	.947734	23.90	.052266	56
5	8.947456	23.63	9.998289	.20	8.949168	23.82	1.050832	55
6	.948874	23.55	.998277	.18	.950597	23.73	.049403	54
7	.950287	23.48	.998266	.18	.952021	23.67	.047979	53
8	.951696	23.40	.998255	.20	.953441	23.58	.046559	52
9	.953100	23.32	.998243	.18	.954856	23.52	.045144	51
10	8.954499	23.25	9.998232	.20	8.956267	23.45	1.043733	50
11	.955894	23.17	.998220	.18	.957674	23.35	.042326	49
12	.957284	23.10	.998209	.20	.959075	23.30	.040925	48
13	.958670	23.03	.998197	.18	.960473	23.22	.039527	47
14	.960052	22.95	.998186	.20	.961866	23.15	.038134	46
15	8.961429	22.87	9.998174	.18	8.963255	23.07	1.036745	45
16	.962801	22.82	.998163	.20	.964639	23.00	.035361	44
17	.964170	22.73	.998151	.20	.966019	22.92	.033981	43
18	.965534	22.65	.998139	.18	.967394	22.87	.032606	42
19	.966893	22.60	.998128	.20	.968766	22.78	.031234	41
20	8.968249	22.52	9.998116	.20	8.970133	22.72	1.029867	40
21	.969600	22.45	.998104	.20	.971496	22.65	.028504	39
22	.970947	22.37	.998092	.20	.972855	22.57	.027145	38
23	.972289	22.32	.998080	.20	.974209	22.52	.025791	37
24	.973628	22.23	.998068	.20	.975560	22.43	.024440	36
25	8.974962	22.18	9.998056	.20	8.976906	22.37	1.023094	35
26	.976293	22.10	.998044	.20	.978248	22.30	.021752	34
27	.977619	22.03	.998032	.20	.979586	22.25	.020414	33
28	.978941	21.97	.998020	.20	.980921	22.17	.019079	32
29	.980259	21.90	.998008	.20	.982251	22.10	.017749	31
30	8.981573	21.83	9.997996	.20	8.983577	22.03	1.016423	30
31	.982883	21.77	.997984	.20	.984899	21.97	.015101	29
32	.984189	21.70	.997972	.22	.986217	21.92	.013783	28
33	.985491	21.63	.997959	.20	.987532	21.83	.012468	27
34	.986789	21.57	.997947	.20	.988842	21.78	.011158	26
35	8.988083	21.52	9.997935	.22	8.990149	21.70	1.009851	25
36	.989374	21.43	.997922	.20	.991451	21.65	.008549	24
37	.990660	21.38	.997910	.22	.992750	21.58	.007250	23
38	.991943	21.32	.997897	.20	.994045	21.53	.005955	22
39	.993222	21.25	.997885	.22	.995337	21.45	.004663	21
40	8.994497	21.18	9.997872	.20	8.996624	21.40	1.003376	20
41	.995768	21.13	.997860	.22	.997908	21.33	.002092	19
42	.997036	21.05	.997847	.20	.999188	21.28	.000812	18
43	.998299	21.02	.997835	.22	9.000465	21.22	0.999535	17
44	.999560	20.93	.997822	.22	.001738	21.15	.998262	16
45	9.000816	20.88	9.997809	.20	9.003007	21.08	0.996993	15
46	.002069	20.82	.997797	.22	.004272	21.03	.995728	14
47	.003318	20.75	.997784	.22	.005534	20.97	.994466	13
48	.004563	20.70	.997771	.22	.006792	20.92	.993208	12
49	.005805	20.65	.997758	.22	.008047	20.85	.991953	11
50	9.007044	20.57	9.997745	.22	9.009298	20.80	0.990702	10
51	.008278	20.53	.997732	.22	.010546	20.73	.989454	9
52	.009510	20.45	.997719	.22	.011790	20.68	.988210	8
53	.010737	20.42	.997706	.22	.013031	20.62	.986969	7
54	.011962	20.33	.997693	.22	.014268	20.57	.985732	6
55	9.013182	20.30	9.997680	.22	9.015502	20.50	0.984498	5
56	.014400	20.22	.997667	.22	.016732	20.45	.983268	4
57	.015613	20.18	.997654	.22	.017959	20.40	.982041	3
58	.016824	20.12	.997641	.22	.019183	20.33	.980817	2
59	.018031	20.07	.997628	.23	.020403	20.28	.979597	1
60	9.019235		9.997614		9.021620		0.978380	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

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M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.
0	9.019235	20.00	9.997614	.22	9.021620	20.23	0.978380
1	.020435	19.95	.997601	.22	.022834	20.17	.977166
2	.021632	19.88	.997588	.23	.024044	20.12	.975956
3	.022825	19.85	.997574	.22	.025251	20.07	.974749
4	.024016	19.78	.997561	.23	.026455	20.00	.973545
5	9.025203	19.72	9.997547	.22	9.027655	19.95	0.972345
6	.026386	19.68	.997534	.23	.028852	19.90	.971148
7	.027567	19.62	.997520	.22	.030046	19.85	.969954
8	.028744	19.57	.997507	.23	.031237	19.80	.968763
9	.029918	19.52	.997493	.22	.032425	19.73	.967575
10	9.031089	19.47	9.997480	.23	9.033609	19.70	0.966391
11	.032257	19.40	.997466	.23	.034791	19.63	.965209
12	.033421	19.35	.997452	.22	.035969	19.58	.964031
13	.034582	19.32	.997439	.23	.037144	19.53	.962856
14	.035741	19.25	.997425	.23	.038316	19.48	.961684
15	9.036896	19.20	9.997411	.23	9.039485	19.43	0.960515
16	.038048	19.15	.997397	.23	.040651	19.37	.959349
17	.039197	19.08	.997383	.23	.041813	19.33	.958187
18	.040342	19.05	.997369	.23	.042973	19.28	.957027
19	.041485	19.00	.997355	.23	.044130	19.23	.955870
20	9.042625	18.95	9.997341	.23	9.045284	19.17	0.954716
21	.043762	18.88	.997327	.23	.046434	19.13	.953566
22	.044895	18.85	.997313	.23	.047582	19.08	.952418
23	.046026	18.80	.997299	.23	.048727	19.03	.951273
24	.047154	18.75	.997285	.23	.049869	18.98	.950131
25	9.048279	18.68	9.997271	.23	9.051008	18.93	0.948992
26	.049400	18.65	.997257	.25	.052144	18.88	.947856
27	.050519	18.60	.997242	.23	.053277	18.83	.946723
28	.051635	18.57	.997228	.23	.054407	18.80	.945593
29	.052749	18.50	.997214	.25	.055535	18.73	.944465
30	9.053859	18.45	9.997199	.23	9.056659	18.70	0.943341
31	.054966	18.42	.997185	.25	.057781	18.65	.942219
32	.056071	18.35	.997170	.23	.058900	18.60	.941100
33	.057172	18.32	.997156	.25	.060016	18.57	.939984
34	.058271	18.27	.997141	.23	.061130	18.50	.938870
35	9.059367	18.22	9.997127	.25	9.062240	18.47	0.937760
36	.060460	18.18	.997112	.23	.063348	18.42	.936652
37	.061551	18.13	.997098	.25	.064453	18.38	.935547
38	.062639	18.08	.997083	.25	.065556	18.32	.934444
39	.063724	18.03	.997068	.25	.066655	18.28	.933345
40	9.064806	17.98	9.997053	.23	9.067752	18.23	0.932248
41	.065885	17.95	.997039	.25	.068846	18.20	.931154
42	.066962	17.90	.997024	.25	.069938	18.15	.930062
43	.068036	17.85	.997009	.25	.071027	18.10	.928973
44	.069107	17.82	.996994	.25	.072113	18.07	.927887
45	9.070176	17.77	9.996979	.25	9.073197	18.02	0.926803
46	.071242	17.73	.996964	.25	.074278	17.97	.925722
47	.072306	17.67	.996949	.25	.075356	17.93	.924644
48	.073366	17.63	.996934	.25	.076432	17.88	.923568
49	.074424	17.60	.996919	.25	.077505	17.85	.922495
50	9.075480	17.55	9.996904	.25	9.078576	17.80	0.921424
51	.076533	17.50	.996889	.25	.079644	17.77	.920356
52	.077583	17.47	.996874	.27	.080710	17.72	.919290
53	.078631	17.42	.996858	.25	.081773	17.67	.918227
54	.079676	17.38	.996843	.25	.082833	17.63	.917167
55	9.080719	17.33	9.996828	.27	9.083891	17.60	0.916109
56	.081759	17.30	.996812	.25	.084947	17.55	.915053
57	.082797	17.25	.996797	.25	.086000	17.50	.914000
58	.083832	17.20	.996782	.27	.087050	17.47	.912950
59	.084864	17.17	.996766	.25	.088098	17.43	.911902
60	9.085894		9.996751		9.089144		0.910856
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.

96°

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.085894	17.13	9.996751	.27	9.089144	17.38	0.910856	60
1	.086922	17.08	.996735	.25	.090187	17.35	.909813	59
2	.087947	17.05	.996720	.27	.091228	17.30	.908772	58
3	.088970	17.00	.996704	.27	.092266	17.27	.907734	57
4	.089990	16.97	.996688	.25	.093302	17.23	.906698	56
5	9.091008	16.93	9.996673	.27	9.094336	17.18	0.905664	55
6	.092024	16.88	.996657	.27	.095367	17.13	.904633	54
7	.093037	16.83	.996641	.27	.096395	17.12	.903605	53
8	.094047	16.82	.996625	.25	.097422	17.07	.902578	52
9	.095056	16.77	.996610	.27	.098446	17.03	.901554	51
10	9.096062	16.72	9.996594	.27	9.099468	16.98	0.900532	50
11	.097065	16.68	.996578	.27	.100487	16.95	.899513	49
12	.098066	16.65	.996562	.27	.101504	16.92	.898496	48
13	.099065	16.62	.996546	.27	.102519	16.88	.897481	47
14	.100062	16.57	.996530	.27	.103532	16.83	.896468	46
15	9.101056	16.53	9.996514	.27	9.104542	16.80	0.895458	45
16	.102048	16.48	.996498	.27	.105550	16.77	.894450	44
17	.103037	16.47	.996482	.28	.106556	16.72	.893444	43
18	.104025	16.42	.996465	.27	.107559	16.68	.892441	42
19	.105010	16.37	.996449	.27	.108560	16.65	.891440	41
20	9.105992	16.35	9.996433	.27	9.109559	16.62	0.890441	40
21	.106973	16.30	.996417	.28	.110556	16.58	.889444	39
22	.107951	16.27	.996400	.27	.111551	16.53	.888449	38
23	.108927	16.23	.996384	.27	.112543	16.50	.887457	37
24	.109901	16.20	.996368	.28	.113533	16.47	.886467	36
25	9.110873	16.15	9.996351	.27	9.114521	16.43	0.885479	35
26	.111842	16.12	.996335	.28	.115507	16.40	.884493	34
27	.112809	16.08	.996318	.27	.116491	16.35	.883509	33
28	.113774	16.05	.996302	.28	.117472	16.33	.882528	32
29	.114737	16.02	.996285	.27	.118452	16.28	.881548	31
30	9.115698	15.97	9.996269	.28	9.119429	16.25	0.880571	30
31	.116656	15.95	.996252	.28	.120404	16.22	.879596	29
32	.117613	15.90	.996235	.27	.121377	16.18	.878623	28
33	.118567	15.87	.996219	.28	.122348	16.15	.877652	27
34	.119519	15.83	.996202	.28	.123317	16.12	.876683	26
35	9.120469	15.80	9.996185	.28	9.124284	16.08	0.875716	25
36	.121417	15.75	.996168	.28	.125249	16.03	.874751	24
37	.122362	15.73	.996151	.28	.126211	16.02	.873789	23
38	.123306	15.70	.996134	.28	.127172	15.97	.872828	22
39	.124248	15.65	.996117	.28	.128130	15.95	.871870	21
40	9.125187	15.63	9.996100	.28	9.129087	15.90	0.870913	20
41	.126125	15.58	.996083	.28	.130041	15.88	.869959	19
42	.127060	15.55	.996066	.28	.130994	15.83	.869006	18
43	.127993	15.53	.996049	.28	.131944	15.82	.868056	17
44	.128925	15.48	.996032	.28	.132893	15.77	.867107	16
45	9.129854	15.45	9.996015	.28	9.133839	15.75	0.866161	15
46	.130781	15.42	.995998	.30	.134784	15.70	.865216	14
47	.131706	15.40	.995980	.28	.135726	15.68	.864274	13
48	.132630	15.35	.995963	.28	.136667	15.63	.863333	12
49	.133551	15.32	.995946	.30	.137605	15.62	.862395	11
50	9.134470	15.28	9.995928	.28	9.138542	15.57	0.861458	10
51	.135387	15.27	.995911	.28	.139476	15.55	.860524	9
52	.136303	15.22	.995894	.30	.140409	15.52	.859591	8
53	.137216	15.20	.995876	.28	.141340	15.48	.858660	7
54	.138128	15.15	.995859	.30	.142269	15.45	.857731	6
55	9.139037	15.12	9.995841	.30	9.143196	15.42	0.856804	5
56	.139944	15.10	.995823	.28	.144121	15.38	.855879	4
57	.140850	15.07	.995806	.30	.145044	15.37	.854956	3
58	.141754	15.02	.995788	.28	.145966	15.32	.854034	2
59	.142655	15.00	.995771	.30	.146885	15.30	.853115	1
60	9.143555		9.995753		9.147803		0.852197	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

°97 82°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.
0	9.143555	14.97	9.995753	.30	9.147803	15.25	0.852197
1	.144453	14.93	.995735	.30	.148718	15.23	.851282
2	.145349	14.90	.995717	.30	.149632	15.20	.850368
3	.146243	14.88	.995699	.30	.150544	15.17	.849456
4	.147136	14.83	.995681	.28	.151454	15.15	.848546
5	9.148026	14.82	9.995664	.30	9.152363	15.10	0.847637
6	.148915	14.78	.995646	.30	.153269	15.08	.846731
7	.149802	14.73	.995628	.30	.154174	15.05	.845826
8	.150686	14.72	.995610	.32	.155077	15.02	.844923
9	.151569	14.70	.995591	.30	.155978	14.98	.844022
10	9.152451	14.65	9.995573	.30	9.156877	14.97	0.843123
11	.153330	14.63	.995555	.30	.157775	14.93	.842225
12	.154208	14.58	.995537	.30	.158671	14.90	.841329
13	.155083	14.57	.995519	.30	.159565	14.87	.840435
14	.155957	14.55	.995501	.32	.160457	14.83	.839543
15	9.156830	14.50	9.995482	.30	9.161347	14.82	0.838653
16	.157700	14.48	.995464	.30	.162236	14.78	.837764
17	.158569	14.43	.995446	.32	.163123	14.75	.836877
18	.159435	14.43	.995427	.30	.164008	14.73	.835992
19	.160301	14.38	.995409	.32	.164892	14.70	.835108
20	9.161164	14.35	9.995390	.30	9.165774	14.67	0.834226
21	.162025	14.33	.995372	.32	.166654	14.63	.833346
22	.162885	14.30	.995353	.32	.167532	14.62	.832468
23	.163743	14.28	.995334	.30	.168409	14.58	.831591
24	.164600	14.23	.995316	.32	.169284	14.55	.830716
25	9.165454	14.22	9.995297	.32	9.170157	14.53	0.829843
26	.166307	14.20	.995278	.30	.171029	14.50	.828971
27	.167159	14.15	.995260	.32	.171899	14.47	.828101
28	.168008	14.13	.995241	.32	.172767	14.45	.827233
29	.168856	14.10	.995222	.32	.173634	14.42	.826366
30	9.169702	14.08	9.995203	.32	9.174499	14.38	0.825501
31	.170547	14.03	.995184	.32	.175362	14.37	.824638
32	.171389	14.02	.995165	.32	.176224	14.33	.823776
33	.172230	14.00	.995146	.32	.177084	14.30	.822916
34	.173070	13.97	.995127	.32	.177942	14.28	.822058
35	9.173908	13.93	9.995108	.32	9.178799	14.27	0.821201
36	.174744	13.90	.995089	.32	.179655	14.22	.820345
37	.175578	13.88	.995070	.32	.180508	14.20	.819492
38	.176411	13.85	.995051	.32	.181360	14.18	.818640
39	.177242	13.83	.995032	.32	.182211	14.13	.817789
40	9.178072	13.80	9.995013	.33	9.183059	14.13	0.816941
41	.178900	13.77	.994993	.32	.183907	14.08	.816093
42	.179726	13.75	.994974	.32	.184752	14.08	.815248
43	.180551	13.72	.994955	.33	.185597	14.03	.814403
44	.181374	13.70	.994935	.32	.186439	14.02	.813561
45	9.182196	13.67	9.994916	.33	9.187280	14.00	0.812720
46	.183016	13.63	.994896	.32	.188120	13.97	.811880
47	.183834	13.62	.994877	.33	.188958	13.93	.811042
48	.184651	13.58	.994857	.32	.189794	13.92	.810206
49	.185466	13.57	.994838	.33	.190629	13.88	.809371
50	9.186280	13.53	9.994818	.33	9.191462	13.87	0.808538
51	.187092	13.52	.994798	.32	.192294	13.83	.807706
52	.187903	13.48	.994779	.33	.193124	13.82	.806876
53	.188712	13.45	.994759	.33	.193953	13.78	.806047
54	.189519	13.43	.994739	.32	.194780	13.77	.805220
55	9.190325	13.42	9.994720	.33	9.195606	13.73	0.804394
56	.191130	13.38	.994700	.33	.196430	13.72	.803570
57	.191933	13.35	.994680	.33	.197253	13.68	.802747
58	.192734	13.33	.994660	.33	.198074	13.67	.801926
59	.193534	13.30	.994640	.33	.198894	13.65	.801106
60	9.194332		9.994620		9.199713		0.800287
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.

98°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.194332	13.28	9.994620	.33	9.199713	13.60	0.800287	60
1	.195129	13.27	.994600	.33	.200529	13.60	.799471	59
2	.195925	13.23	.994580	.33	.201345	13.57	.798655	58
3	.196719	13.20	.994560	.33	.202159	13.53	.797841	57
4	.197511	13.18	.994540	.35	.202971	13.52	.797029	56
5	9.198302	13.15	9.994519	.33	9.203782	13.50	0.796218	55
6	.199091	13.13	.994499	.33	.204592	13.47	.795408	54
7	.199879	13.12	.994479	.33	.205400	13.45	.794600	53
8	.200666	13.08	.994459	.35	.206207	13.43	.793793	52
9	.201451	13.05	.994438	.33	.207013	13.40	.792987	51
10	9.202234	13.05	9.994418	.33	9.207817	13.37	0.792183	50
11	.203017	13.00	.994398	.35	.208619	13.35	.791381	49
12	.203797	13.00	.994377	.33	.209420	13.33	.790580	48
13	.204577	12.95	.994357	.35	.210220	13.30	.789780	47
14	.205354	12.95	.994336	.33	.211018	13.28	.788982	46
15	9.206131	12.92	9.994316	.35	9.211815	13.27	0.788185	45
16	.206906	12.88	.994295	.35	.212611	13.23	.787389	44
17	.207679	12.88	.994274	.33	.213405	13.22	.786595	43
18	.208452	12.83	.994254	.35	.214198	13.18	.785802	42
19	.209222	12.83	.994233	.35	.214989	13.18	.785011	41
20	9.209992	12.80	9.994212	.35	9.215780	13.13	0.784220	40
21	.210760	12.77	.994191	.33	.216568	13.13	.783432	39
22	.211526	12.75	.994171	.35	.217356	13.10	.782644	38
23	.212291	12.73	.994150	.35	.218142	13.07	.781858	37
24	.213055	12.72	.994129	.35	.218926	13.07	.781074	36
25	9.213818	12.68	9.994108	.35	9.219710	13.03	0.780290	35
26	.214579	12.65	.994087	.35	.220492	13.00	.779508	34
27	.215338	12.65	.994066	.35	.221272	13.00	.778728	33
28	.216097	12.62	.994045	.35	.222052	12.97	.777948	32
29	.216854	12.58	.994024	.35	.222830	12.95	.777170	31
30	9.217609	12.57	9.994003	.35	9.223607	12.92	0.776393	30
31	.218363	12.55	.993982	.37	.224382	12.90	.775618	29
32	.219116	12.53	.993960	.35	.225156	12.88	.774844	28
33	.219868	12.50	.993939	.35	.225929	12.85	.774071	27
34	.220618	12.48	.993918	.35	.226700	12.85	.773300	26
35	9.221367	12.47	9.993897	.37	9.227471	12.80	0.772529	25
36	.222115	12.43	.993875	.35	.228239	12.80	.771761	24
37	.222861	12.42	.993854	.37	.229007	12.77	.770993	23
38	.223606	12.38	.993832	.35	.229773	12.77	.770227	22
39	.224349	12.38	.993811	.37	.230539	12.72	.769461	21
40	9.225092	12.35	9.993789	.35	9.231302	12.72	0.768698	20
41	.225833	12.33	.993768	.37	.232065	12.68	.767935	19
42	.226573	12.30	.993746	.35	.232826	12.67	.767174	18
43	.227311	12.28	.993725	.37	.233586	12.65	.766414	17
44	.228048	12.27	.993703	.37	.234345	12.63	.765655	16
45	9.228784	12.23	9.993681	.35	9.235103	12.60	0.764897	15
46	.229518	12.23	.993660	.37	.235859	12.58	.764141	14
47	.230252	12.20	.993638	.37	.236614	12.57	.763386	13
48	.230984	12.18	.993616	.37	.237368	12.53	.762632	12
49	.231715	12.15	.993594	.37	.238120	12.53	.761880	11
50	9.232444	12.13	9.993572	.37	9.238872	12.50	0.761128	10
51	.233172	12.12	.993550	.37	.239622	12.48	.760378	9
52	.233899	12.10	.993528	.37	.240371	12.45	.759629	8
53	.234625	12.07	.993506	.37	.241118	12.45	.758882	7
54	.235349	12.07	.993484	.37	.241865	12.42	.758135	6
55	9.236073	12.03	9.993462	.37	9.242610	12.40	0.757390	5
56	.236795	12.00	.993440	.37	.243354	12.38	.756646	4
57	.237515	12.00	.993418	.37	.244097	12.37	.755903	3
58	.238235	11.97	.993396	.37	.244839	12.33	.755161	2
59	.238953	11.95	.993374	.38	.245579	12.33	.754421	1
60	9.239670		9.993351		9.246319		0.753681	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.239670	11.93	9.993351	.37	9.246319	12.30	0.753681	60
1	.240386	11.92	.993329	.37	.247057	12.28	.752943	59
2	.241101	11.88	.993307	.38	.247794	12.27	.752206	58
3	.241814	11.87	.993284	.37	.248530	12.23	.751470	57
4	.242526	11.85	.993262	.37	.249264	12.23	.750736	56
5	9.243237	11.83	9.993240	.38	9.249998	12.20	0.750002	55
6	.243947	11.82	.993217	.37	.250730	12.18	.749270	54
7	.244656	11.78	.993195	.38	.251461	12.17	.748539	53
8	.245363	11.77	.993172	.38	.252191	12.15	.747809	52
9	.246069	11.77	.993149	.37	.252920	12.13	.747080	51
10	9.246775	11.72	9.993127	.38	9.253648	12.10	0.746352	50
11	.247478	11.72	.993104	.38	.254374	12.10	.745626	49
12	.248181	11.70	.993081	.37	.255100	12.07	.744900	48
13	.248883	11.67	.993059	.38	.255824	12.05	.744176	47
14	.249583	11.65	.993036	.38	.256547	12.03	.743453	46
15	9.250282	11.63	9.993013	.38	9.257269	12.02	0.742731	45
16	.250980	11.62	.992990	.38	.257990	12.00	.742010	44
17	.251677	11.60	.992967	.38	.258710	11.98	.741290	43
18	.252373	11.57	.992944	.38	.259429	11.95	.740571	42
19	.253067	11.57	.992921	.38	.260146	11.95	.739854	41
20	9.253761	11.53	9.992898	.38	9.260863	11.92	0.739137	40
21	.254453	11.52	.992875	.38	.261578	11.90	.738422	39
22	.255144	11.50	.992852	.38	.262292	11.88	.737708	38
23	.255834	11.48	.992829	.38	.263005	11.87	.736995	37
24	.256523	11.47	.992806	.38	.263717	11.85	.736283	36
25	9.257211	11.45	9.992783	.40	9.264428	11.83	0.735572	35
26	.257898	11.42	.992759	.38	.265138	11.82	.734862	34
27	.258583	11.42	.992736	.38	.265847	11.80	.734153	33
28	.259268	11.38	.992713	.38	.266555	11.77	.733445	32
29	.259951	11.37	.992690	.40	.267261	11.77	.732739	31
30	9.260633	11.35	9.992666	.38	9.267967	11.73	0.732033	30
31	.261314	11.33	.992643	.40	.268671	11.73	.731329	29
32	.261994	11.32	.992619	.38	.269375	11.70	.730625	28
33	.262673	11.30	.992596	.40	.270077	11.70	.729923	27
34	.263351	11.27	.992572	.38	.270779	11.67	.729221	26
35	9.264027	11.27	9.992549	.40	9.271479	11.65	0.728521	25
36	.264703	11.23	.992525	.40	.272178	11.63	.727822	24
37	.265377	11.23	.992501	.38	.272876	11.62	.727124	23
38	.266051	11.20	.992478	.40	.273573	11.60	.726427	22
39	.266723	11.20	.992454	.40	.274269	11.58	.725731	21
40	9.267395	11.17	9.992430	.40	9.274964	11.57	0.725036	20
41	.268065	11.15	.992406	.40	.275658	11.55	.724342	19
42	.268734	11.13	.992382	.38	.276351	11.53	.723649	18
43	.269402	11.12	.992359	.40	.277043	11.52	.722957	17
44	.270069	11.10	.992335	.40	.277734	11.50	.722266	16
45	9.270735	11.08	9.992311	.40	9.278424	11.48	0.721576	15
46	.271400	11.07	.992287	.40	.279113	11.47	.720887	14
47	.272064	11.03	.992263	.40	.279801	11.45	.720199	13
48	.272726	11.03	.992239	.42	.280488	11.43	.719512	12
49	.273388	11.02	.992214	.40	.281174	11.40	.718826	11
50	9.274049	10.98	9.992190	.40	9.281858	11.40	0.718142	10
51	.274708	10.98	.992166	.40	.282542	11.38	.717458	9
52	.275367	10.97	.992142	.40	.283225	11.37	.716775	8
53	.276025	10.93	.992118	.42	.283907	11.35	.716093	7
54	.276681	10.93	.992093	.40	.284588	11.33	.715412	6
55	9.277337	10.90	9.992069	.42	9.285268	11.32	0.714732	5
56	.277991	10.90	.992044	.40	.285947	11.28	.714053	4
57	.278645	10.87	.992020	.40	.286624	11.28	.713376	3
58	.279297	10.85	.991996	.42	.287301	11.27	.712699	2
59	.279948	10.85	.991971	.40	.287977	11.25	.712023	1
60	9.280599		9.991947		9.288652		0.711348	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.
0	9.280599	10.82	9.991947	.42	9.288652	11.23	0.711348
1	.281248	10.82	.991922	.42	.289326	11.22	.710674
2	.281897	10.78	.991897	.40	.289999	11.20	.710001
3	.282544	10.77	.991873	.42	.290671	11.18	.709329
4	.283190	10.77	.991848	.42	.291342	11.18	.708658
5	9.283836	10.73	9.991823	.40	9.292013	11.15	0.707987
6	.284480	10.73	.991799	.42	.292682	11.13	.707318
7	.285124	10.70	.991774	.42	.293350	11.12	.706650
8	.285766	10.70	.991749	.42	.294017	11.12	.705983
9	.286408	10.67	.991724	.42	.294684	11.08	.705316
10	9.287048	10.67	9.991699	.42	9.295349	11.07	0.704651
11	.287688	10.63	.991674	.42	.296013	11.07	.703987
12	.288326	10.63	.991649	.42	.296677	11.03	.703323
13	.288964	10.60	.991624	.42	.297339	11.03	.702661
14	.289600	10.60	.991599	.42	.298001	11.02	.701999
15	9.290236	10.57	9.991574	.42	9.298662	11.00	0.701338
16	.290870	10.57	.991549	.42	.299322	10.97	.700678
17	.291504	10.55	.991524	.43	.299980	10.97	.700020
18	.292137	10.52	.991498	.42	.300638	10.95	.699362
19	.292768	10.52	.991473	.42	.301295	10.93	.698705
20	9.293399	10.50	9.991448	.43	9.301951	10.93	0.698049
21	.294029	10.48	.991422	.42	.302607	10.90	.697393
22	.294658	10.47	.991397	.42	.303261	10.88	.696739
23	.295286	10.45	.991372	.43	.303914	10.88	.696086
24	.295913	10.43	.991346	.42	.304567	10.85	.695433
25	9.296539	10.42	9.991321	.43	9.305218	10.85	0.694782
26	.297164	10.40	.991295	.42	.305869	10.83	.694131
27	.297788	10.40	.991270	.43	.306519	10.82	.693481
28	.298412	10.37	.991244	.43	.307168	10.80	.692832
29	.299034	10.35	.991218	.42	.307816	10.78	.692184
30	9.299655	10.35	9.991193	.43	9.308463	10.77	0.691537
31	.300276	10.32	.991167	.43	.309109	10.75	.690891
32	.300895	10.32	.991141	.43	.309754	10.75	.690246
33	.301514	10.30	.991115	.42	.310399	10.72	.689601
34	.302132	10.27	.991090	.43	.311042	10.72	.688958
35	9.302748	10.27	9.991064	.43	9.311685	10.70	0.688315
36	.303364	10.25	.991038	.43	.312327	10.68	.687673
37	.303979	10.23	.991012	.43	.312968	10.67	.687032
38	.304593	10.23	.990986	.43	.313608	10.65	.686392
39	.305207	10.20	.990960	.43	.314247	10.63	.685753
40	9.305819	10.18	9.990934	.43	9.314885	10.63	0.685115
41	.306430	10.18	.990908	.43	.315523	10.60	.684477
42	.307041	10.15	.990882	.45	.316159	10.60	.683841
43	.307650	10.15	.990855	.43	.316795	10.58	.683205
44	.308259	10.13	.990829	.43	.317430	10.57	.682570
45	9.308867	10.12	9.990803	.43	9.318064	10.55	0.681936
46	.309474	10.10	.990777	.45	.318697	10.55	.681303
47	.310080	10.08	.990750	.43	.319330	10.52	.680670
48	.310685	10.07	.990724	.45	.319961	10.52	.680039
49	.311289	10.07	.990697	.43	.320592	10.50	.679408
50	9.311893	10.03	9.990671	.43	9.321222	10.48	0.678778
51	.312495	10.03	.990645	.45	.321851	10.47	.678149
52	.313097	10.02	.990618	.45	.322479	10.45	.677521
53	.313698	9.98	.990591	.43	.323106	10.45	.676894
54	.314297	10.00	.990565	.45	.323733	10.42	.676267
55	9.314897	9.97	9.990538	.45	9.324358	10.42	0.675642
56	.315495	9.95	.990511	.43	.324983	10.40	.675017
57	.316092	9.95	.990485	.45	.325607	10.40	.674393
58	.316689	9.92	.990458	.45	.326231	10.37	.673769
59	.317284	9.92	.990431	.45	.326853	10.37	.673147
60	9.317879		9.990404		9.327475		0.672525
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.
0	9.317879	9.90	9.990404	.43	9.327475	10.33	0.672525
1	.318473	9.88	.990378	.45	.328095	10.33	.671905
2	.319066	9.87	.990351	.45	.328715	10.32	.671285
3	.319658	9.85	.990324	.45	.329334	10.32	.670666
4	.320249	9.85	.990297	.45	.329953	10.28	.670047
5	9.320840	9.83	9.990270	.45	9.330570	10.28	0.669430
6	.321430	9.82	.990243	.47	.331187	10.27	.668813
7	.322019	9.80	.990215	.45	.331803	10.25	.668197
8	.322607	9.78	.990188	.45	.332418	10.25	.667582
9	.323194	9.77	.990161	.45	.333033	10.22	.666967
10	9.323780	9.77	9.990134	.45	9.333646	10.22	0.666354
11	.324366	9.73	.990107	.47	.334259	10.20	.665741
12	.324950	9.73	.990079	.45	.334871	10.18	.665129
13	.325534	9.72	.990052	.45	.335482	10.18	.664518
14	.326117	9.72	.990025	.47	.336093	10.15	.663907
15	9.326700	9.68	9.989997	.45	9.336702	10.15	0.663298
16	.327281	9.68	.989970	.47	.337311	10.13	.662689
17	.327862	9.67	.989942	.45	.337919	10.13	.662081
18	.328442	9.65	.989915	.47	.338527	10.10	.661473
19	.329021	9.63	.989887	.45	.339133	10.10	.660867
20	9.329599	9.62	9.989860	.47	9.339739	10.08	0.660261
21	.330176	9.62	.989832	.47	.340344	10.07	.659656
22	.330753	9.60	.989804	.45	.340948	10.07	.659052
23	.331329	9.57	.989777	.47	.341552	10.05	.658448
24	.331903	9.58	.989749	.47	.342155	10.03	.657845
25	9.332478	9.55	9.989721	.47	9.342757	10.02	0.657243
26	.333051	9.55	.989693	.47	.343358	10.00	.656642
27	.333624	9.52	.989665	.47	.343958	10.00	.656042
28	.334195	9.53	.989637	.45	.344558	9.98	.655442
29	.334767	9.50	.989610	.47	.345157	9.97	.654843
30	9.335337	9.48	9.989582	.48	9.345755	9.97	0.654245
31	.335906	9.48	.989553	.47	.346353	9.93	.653647
32	.336475	9.47	.989525	.47	.346949	9.93	.653051
33	.337043	9.45	.989497	.47	.347545	9.93	.652455
34	.337610	9.43	.989469	.47	.348141	9.90	.651859
35	9.338176	9.43	9.989441	.47	9.348735	9.90	0.651265
36	.338742	9.42	.989413	.47	.349329	9.88	.650671
37	.339307	9.40	.989385	.48	.349922	9.87	.650078
38	.339871	9.38	.989356	.47	.350514	9.87	.649486
39	.340434	9.37	.989328	.47	.351106	9.85	.648894
40	9.340996	9.37	9.989300	.48	9.351697	9.83	0.648303
41	.341558	9.35	.989271	.47	.352287	9.82	.647713
42	.342119	9.33	.989243	.48	.352876	9.82	.647124
43	.342679	9.33	.989214	.47	.353465	9.80	.646535
44	.343239	9.30	.989186	.48	.354053	9.78	.645947
45	9.343797	9.30	9.989157	.48	9.354640	9.78	0.645360
46	.344355	9.28	.989128	.47	.355227	9.77	.644773
47	.344912	9.28	.989100	.48	.355813	9.75	.644187
48	.345469	9.25	.989071	.48	.356398	9.73	.643602
49	.346024	9.25	.989042	.47	.356982	9.73	.643018
50	9.346579	9.25	9.989014	.48	9.357566	9.72	0.642434
51	.347134	9.22	.988985	.48	.358149	9.70	.641851
52	.347687	9.22	.988956	.48	.358731	9.70	.641269
53	.348240	9.20	.988927	.48	.359313	9.67	.640687
54	.348792	9.18	.988898	.48	.359893	9.68	.640107
55	9.349343	9.17	9.988869	.48	9.360474	9.65	0.639526
56	.349893	9.17	.988840	.48	.361053	9.65	.638947
57	.350443	9.15	.988811	.48	.361632	9.63	.638368
58	.350992	9.13	.988782	.48	.362210	9.62	.637790
59	.351540	9.13	.988753	.48	.362787	9.62	.637213
60	9.352088		9.988724		9.363364		0.636636
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.

Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
9.352088	9.12	9.988724	.48	9.363364	9.60	0.636636	60
.352635	9.10	.988695	.48	.363940	9.58	.636060	59
.353181	9.08	.988666	.50	.364515	9.58	.635485	58
.353726	9.08	.988636	.48	.365090	9.57	.634910	57
.354271	9.07	.988607	.48	.365664	9.55	.634336	56
9.354815	9.05	9.988578	.50	9.366237	9.55	0.633763	55
.355358	9.05	.988548	.48	.366810	9.53	.633190	54
.355901	9.03	.988519	.50	.367382	9.52	.632618	53
.356443	9.02	.988489	.48	.367953	9.52	.632047	52
.356984	9.00	.988460	.50	.368524	9.50	.631476	51
9.357524	9.00	9.988430	.48	9.369094	9.48	0.630906	50
.358064	8.98	.988401	.50	.369663	9.48	.630337	49
.358603	8.97	.988371	.48	.370232	9.45	.629768	48
.359141	8.95	.988342	.50	.370799	9.47	.629201	47
.359678	8.95	.988312	.50	.371367	9.43	.628633	46
9.360215	8.95	9.988282	.50	9.371933	9.43	0.628067	45
.360752	8.92	.988252	.48	.372499	9.42	.627501	44
.361287	8.92	.988223	.50	.373064	9.42	.626936	43
.361822	8.90	.988193	.50	.373629	9.40	.626371	42
.362356	8.88	.988163	.50	.374193	9.38	.625807	41
9.362889	8.88	9.988133	.50	9.374756	9.38	0.625244	40
.363422	8.87	.988103	.50	.375319	9.37	.624681	39
.363954	8.85	.988073	.50	.375881	9.35	.624119	38
.364485	8.85	.988043	.50	.376442	9.35	.623558	37
.365016	8.83	.988013	.50	.377003	9.33	.622997	36
9.365546	8.82	9.987983	.50	9.377563	9.32	0.622437	35
.366075	8.82	.987953	.52	.378122	9.32	.621878	34
.366604	8.78	.987922	.50	.378681	9.30	.621319	33
.367131	8.80	.987892	.50	.379239	9.30	.620761	32
.367659	8.77	.987862	.50	.379797	9.28	.620203	31
9.368185	8.77	9.987832	.52	9.380354	9.27	0.619646	30
.368711	8.75	.987801	.50	.380910	9.27	.619090	29
.369236	8.75	.987771	.52	.381466	9.23	.618534	28
.369761	8.73	.987740	.50	.382020	9.25	.617980	27
.370285	8.72	.987710	.52	.382575	9.23	.617425	26
9.370808	8.70	9.987679	.50	9.383129	9.22	0.616871	25
.371330	8.70	.987649	.52	.383682	9.20	.616318	24
.371852	8.68	.987618	.50	.384234	9.20	.615766	23
.372373	8.68	.987588	.52	.384786	9.18	.615214	22
.372894	8.67	.987557	.52	.385337	9.18	.614663	21
9.373414	8.65	9.987526	.50	9.385888	9.17	0.614112	20
.373933	8.65	.987496	.52	.386438	9.15	.613562	19
.374452	8.63	.987465	.52	.386987	9.15	.613013	18
.374970	8.62	.987434	.52	.387536	9.13	.612464	17
.375487	8.60	.987403	.52	.388084	9.12	.611916	16
9.376003	8.60	9.987372	.52	9.388631	9.12	0.611369	15
.376519	8.60	.987341	.52	.389178	9.10	.610822	14
.377035	8.57	.987310	.52	.389724	9.10	.610276	13
.377549	8.57	.987279	.52	.390270	9.08	.609730	12
.378063	8.57	.987248	.52	.390815	9.08	.609185	11
9.378577	8.53	9.987217	.52	9.391360	9.05	0.608640	10
.379089	8.53	.987186	.52	.391903	9.07	.608097	9
.379601	8.53	.987155	.52	.392447	9.03	.607553	8
.380113	8.52	.987124	.53	.392989	9.03	.607011	7
.380624	8.50	.987092	.52	.393531	9.03	.606469	6
9.381134	8.48	9.987061	.52	9.394073	9.02	0.605927	5
.381643	8.48	.987030	.53	.394614	9.00	.605386	4
.382152	8.48	.986998	.52	.395154	9.00	.604846	3
.382661	8.45	.986967	.52	.395694	8.98	.604306	2
.383168	8.45	.986936	.53	.396233	8.97	.603767	1
9.383675		9.986904		9.396771		0.603229	0
Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.383675	8.45	9.986904	.52	9.396771	8.97	0.603229	60
1	.384182	8.42	.986873	.53	.397309	8.95	.602691	59
2	.384687	8.42	.986841	.53	.397846	8.95	.602154	58
3	.385192	8.42	.986809	.52	.398383	8.93	.601617	57
4	.385697	8.40	.986778	.53	.398919	8.93	.601081	56
5	9.386201	8.38	9.986746	.53	9.399455	8.92	0.600545	55
6	.386704	8.38	.986714	.52	.399990	8.90	.600010	54
7	.387207	8.37	.986683	.53	.400524	8.90	.599476	53
8	.387709	8.35	.986651	.53	.401058	8.88	.598942	52
9	.388210	8.35	.986619	.53	.401591	8.88	.598409	51
10	9.388711	8.33	9.986587	.53	9.402124	8.87	0.597876	50
11	.389211	8.33	.986555	.53	.402656	8.85	.597344	49
12	.389711	8.32	.986523	.53	.403187	8.85	.596813	48
13	.390210	8.30	.986491	.53	.403718	8.85	.596282	47
14	.390708	8.30	.986459	.53	.404249	8.82	.595751	46
15	9.391206	8.28	9.986427	.53	9.404778	8.83	0.595222	45
16	.391703	8.27	.986395	.53	.405308	8.80	.594692	44
17	.392199	8.27	.986363	.53	.405836	8.80	.594164	43
18	.392695	8.27	.986331	.53	.406364	8.80	.593636	42
19	.393191	8.23	.986299	.55	.406892	8.78	.593108	41
20	9.393685	8.23	9.986266	.53	9.407419	8.77	0.592581	40
21	.394179	8.23	.986234	.53	.407945	8.77	.592055	39
22	.394673	8.22	.986202	.55	.408471	8.75	.591529	38
23	.395166	8.20	.986169	.53	.408996	8.75	.591004	37
24	.395658	8.20	.986137	.55	.409521	8.73	.590479	36
25	9.396150	8.18	9.986104	.53	9.410045	8.73	0.589955	35
26	.396641	8.18	.986072	.55	.410569	8.72	.589431	34
27	.397132	8.15	.986039	.53	.411092	8.72	.588908	33
28	.397621	8.17	.986007	.55	.411615	8.70	.588385	32
29	.398111	8.15	.985974	.53	.412137	8.68	.587863	31
30	9.398600	8.13	9.985942	.55	9.412658	8.68	0.587342	30
31	.399088	8.12	.985909	.55	.413179	8.67	.586821	29
32	.399575	8.12	.985876	.55	.413699	8.67	.586301	28
33	.400062	8.12	.985843	.53	.414219	8.65	.585781	27
34	.400549	8.10	.985811	.55	.414738	8.65	.585262	26
35	9.401035	8.08	9.985778	.55	9.415257	8.63	0.584743	25
36	.401520	8.08	.985745	.55	.415775	8.63	.584225	24
37	.402005	8.07	.985712	.55	.416293	8.62	.583707	23
38	.402489	8.05	.985679	.55	.416810	8.60	.583190	22
39	.402972	8.05	.985646	.55	.417326	8.60	.582674	21
40	9.403455	8.05	9.985613	.55	9.417842	8.60	0.582158	20
41	.403938	8.03	.985580	.55	.418358	8.58	.581642	19
42	.404420	8.02	.985547	.55	.418873	8.57	.581127	18
43	.404901	8.02	.985514	.57	.419387	8.57	.580613	17
44	.405382	8.00	.985480	.55	.419901	8.57	.580099	16
45	9.405862	7.98	9.985447	.55	9.420415	8.53	0.579585	15
46	.406341	7.98	.985414	.55	.420927	8.55	.579073	14
47	.406820	7.98	.985381	.57	.421440	8.53	.578560	13
48	.407299	7.97	.985347	.55	.421952	8.52	.578048	12
49	.407777	7.95	.985314	.57	.422463	8.52	.577537	11
50	9.408254	7.95	9.985280	.55	9.422974	8.50	0.577026	10
51	.408731	7.93	.985247	.57	.423484	8.48	.576516	9
52	.409207	7.92	.985213	.55	.423993	8.50	.576007	8
53	.409682	7.92	.985180	.57	.424503	8.47	.575497	7
54	.410157	7.92	.985146	.55	.425011	8.47	.574989	6
55	9.410632	7.90	9.985113	.57	9.425519	8.47	0.574481	5
56	.411106	7.88	.985079	.57	.426027	8.45	.573973	4
57	.411579	7.88	.985045	.57	.426534	8.45	.573466	3
58	.412052	7.87	.985011	.55	.427041	8.43	.572959	2
59	.412524	7.87	.984978	.57	.427547	8.42	.572453	1
60	9.412996		9.984944		9.428052		0.571948	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.412996	7.85	9.984944	.57	9.428052	8.43	0.571948	60
1	.413467	7.85	.984910	.57	.428558	8.40	.571442	59
2	.413938	7.83	.984876	.57	.429062	8.40	.570938	58
3	.414408	7.83	.984842	.57	.429566	8.40	.570434	57
4	.414878	7.82	.984808	.57	.430070	8.38	.569930	56
5	9.415347	7.80	9.984774	.57	9.430573	8.37	0.569427	55
6	.415815	7.80	.984740	.57	.431075	8.37	.568925	54
7	.416283	7.80	.984706	.57	.431577	8.37	.568423	53
8	.416751	7.77	.984672	.57	.432079	8.35	.567921	52
9	.417217	7.78	.984638	.58	.432580	8.33	.567420	51
10	9.417684	7.77	9.984603	.57	9.433080	8.33	0.566920	50
11	.418150	7.75	.984569	.57	.433580	8.33	.566420	49
12	.418615	7.73	.984535	.58	.434080	8.32	.565920	48
13	.419079	7.75	.984500	.57	.434579	8.32	.565421	47
14	.419544	7.72	.984466	.57	.435078	8.30	.564922	46
15	9.420007	7.72	9.984432	.58	9.435576	8.28	0.564424	45
16	.420470	7.72	.984397	.57	.436073	8.28	.563927	44
17	.420933	7.70	.984363	.58	.436570	8.28	.563430	43
18	.421395	7.70	.984328	.57	.437067	8.27	.562933	42
19	.421857	7.68	.984294	.58	.437563	8.27	.562437	41
20	9.422318	7.67	9.984259	.58	9.438059	8.25	0.561941	40
21	.422778	7.67	.984224	.57	.438554	8.23	.561446	39
22	.423238	7.65	.934190	.58	.439048	8.25	.560952	38
23	.423697	7.65	.984155	.58	.439543	8.22	.560457	37
24	.424156	7.65	.984120	.58	.440036	8.22	.559964	36
25	9.424615	7.63	9.984085	.58	9.440529	8.22	0.559471	35
26	.425073	7.62	.984050	.58	.441022	8.20	.558978	34
27	.425530	7.62	.984015	.57	.441514	8.20	.558486	33
28	.425987	7.60	.983981	.58	.442006	8.18	.557994	32
29	.426443	7.60	.983946	.58	.442497	8.18	.557503	31
30	9.426899	7.58	9.983911	.60	9.442988	8.18	0.557012	30
31	.427354	7.58	.983875	.58	.443479	8.15	.556521	29
32	.427809	7.57	.983840	.58	.443968	8.17	.556032	28
33	.428263	7.57	.983805	.58	.444458	8.15	.555542	27
34	.428717	7.55	.983770	.58	.444947	8.13	.555053	26
35	9.429170	7.55	9.983735	.58	9.445435	8.13	0.554565	25
36	.429623	7.53	.983700	.60	.445923	8.13	.554077	24
37	.430075	7.53	.983664	.58	.446411	8.12	.553589	23
38	.430527	7.52	.983629	.58	.446898	8.10	.553102	22
39	.430978	7.52	.983594	.60	.447384	8.10	.552616	21
40	9.431429	7.50	9.983558	.58	9.447870	8.10	0.552130	20
41	.431879	7.50	.983523	.60	.448356	8.08	.551644	19
42	.432329	7.48	.983487	.58	.448841	8.08	.551159	18
43	.432778	7.47	.983452	.60	.449326	8.07	.550674	17
44	.433226	7.48	.983416	.58	.449810	8.07	.550190	16
45	9.433675	7.45	9.983381	.60	9.450294	8.05	0.549706	15
46	.434122	7.45	.983345	.60	.450777	8.05	.549223	14
47	.434569	7.45	.983309	.60	.451260	8.05	.548740	13
48	.435016	7.43	.983273	.58	.451743	8.03	.548257	12
49	.435462	7.43	.983238	.60	.452225	8.02	.547775	11
50	9.435908	7.42	9.983202	.60	9.452706	8.02	0.547294	10
51	.436353	7.42	.983166	.60	.453187	8.02	.546813	9
52	.436798	7.40	.983130	.60	.453668	8.00	.546332	8
53	.437242	7.40	.983094	.60	.454148	8.00	.545852	7
54	.437686	7.38	.983058	.60	.454628	7.98	.545372	6
55	9.438129	7.38	9.983022	.60	9.455107	7.98	0.544893	5
56	.438572	7.37	.982986	.60	.455586	7.97	.544414	4
57	.439014	7.37	.982950	.60	.456064	7.97	.543936	3
58	.439456	7.35	.982914	.60	.456542	7.95	.543458	2
59	.439897	7.35	.982878	.60	.457019	7.95	.542981	1
60	9.440338		9.982842		9.457496		0.542504	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.440338	7.33	9.982842	.62	9.457496	7.95	0.542504	60
1	.440778	7.33	.982805	.60	.457973	7.93	.542027	59
2	.441218	7.33	.982769	.60	.458449	7.93	.541551	58
3	.441658	7.30	.982733	.62	.458925	7.92	.541075	57
4	.442096	7.32	.982696	.60	.459400	7.92	.540600	56
5	9.442535	7.30	9.982660	.60	9.459875	7.90	0.540125	55
6	.442973	7.28	.982624	.62	.460349	7.90	.539651	54
7	.443410	7.28	.982587	.60	.460823	7.90	.539177	53
8	.443847	7.28	.982551	.62	.461297	7.88	.538703	52
9	.444284	7.27	.982514	.62	.461770	7.87	.538230	51
10	9.444720	7.25	9.982477	.60	9.462242	7.88	0.537758	50
11	.445155	7.25	.982441	.62	.462715	7.85	.537285	49
12	.445590	7.25	.982404	.62	.463186	7.87	.536814	48
13	.446025	7.23	.982367	.60	.463658	7.83	.536342	47
14	.446459	7.23	.982331	.62	.464128	7.85	.535872	46
15	9.446893	7.22	9.982294	.62	9.464599	7.83	0.535401	45
16	.447326	7.22	.982257	.62	.465069	7.83	.534931	44
17	.447759	7.20	.982220	.62	.465539	7.82	.534461	43
18	.448191	7.20	.982183	.62	.466008	7.82	.533992	42
19	.448623	7.18	.982146	.62	.466477	7.80	.533523	41
20	9.449054	7.18	9.982109	.62	9.466945	7.80	0.533055	40
21	.449485	7.17	.982072	.62	.467413	7.78	.532587	39
22	.449915	7.17	.982035	.62	.467880	7.78	.532120	38
23	.450345	7.17	.981998	.62	.468347	7.78	.531653	37
24	.450775	7.15	.981961	.62	.468814	7.77	.531186	36
25	9.451204	7.13	9.981924	.63	9.469280	7.77	0.530720	35
26	.451632	7.13	.981886	.62	.469746	7.75	.530254	34
27	.452060	7.13	.981849	.62	.470211	7.75	.529789	33
28	.452488	7.12	.981812	.63	.470676	7.75	.529324	32
29	.452915	7.12	.981774	.62	.471141	7.73	.528859	31
30	9.453342	7.10	9.981737	.62	9.471605	7.73	0.528395	30
31	.453768	7.10	.981700	.63	.472069	7.72	.527931	29
32	.454194	7.08	.981662	.62	.472532	7.72	.527468	28
33	.454619	7.08	.981625	.63	.472995	7.70	.527005	27
34	.455044	7.08	.981587	.63	.473457	7.70	.526543	26
35	9.455469	7.07	9.981549	.62	9.473919	7.70	0.526081	25
36	.455893	7.05	.981512	.63	.474381	7.68	.525619	24
37	.456316	7.05	.981474	.63	.474842	7.68	.525158	23
38	.456739	7.05	.981436	.62	.475303	7.67	.524697	22
39	.457162	7.03	.981399	.63	.475763	7.67	.524237	21
40	9.457584	7.03	9.981361	.63	9.476223	7.67	0.523777	20
41	.458006	7.02	.981323	.63	.476683	7.65	.523317	19
42	.458427	7.02	.981285	.63	.477142	7.65	.522858	18
43	.458848	7.00	.981247	.63	.477601	7.63	.522399	17
44	.459268	7.00	.981209	.63	.478059	7.63	.521941	16
45	9.459688	7.00	9.981171	.63	9.478517	7.63	0.521483	15
46	.460108	6.98	.981133	.63	.478975	7.62	.521025	14
47	.460527	6.98	.981095	.63	.479432	7.62	.520568	13
48	.460946	6.97	.981057	.63	.479889	7.60	.520111	12
49	.461364	6.97	.981019	.63	.480345	7.60	.519655	11
50	9.461782	6.95	9.980981	.65	9.480801	7.60	0.519199	10
51	.462199	6.95	.980942	.63	.481257	7.58	.518743	9
52	.462616	6.93	.980904	.63	.481712	7.58	.518288	8
53	.463032	6.93	.980866	.65	.482167	7.57	.517833	7
54	.463448	6.93	.980827	.63	.482621	7.57	.517379	6
55	9.463864	6.92	9.980789	.65	9.483075	7.57	0.516925	5
56	.464279	6.92	.980750	.63	.483529	7.55	.516471	4
57	.464694	6.90	.980712	.65	.483982	7.55	.516018	3
58	.465108	6.90	.980673	.63	.484435	7.53	.515565	2
59	.465522	6.88	.980635	.65	.484887	7.53	.515113	1
60	9.465935		9.980596		9.485339		0.514661	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.465935	6.88	9.980596	.63	9.485339	7.53	0.514661	60
1	.466348	6.88	.980558	.65	.485791	7.52	.514209	59
2	.466761	6.87	.980519	.65	.486242	7.52	.513758	58
3	.467173	6.87	.980480	.63	.486693	7.50	.513307	57
4	.467585	6.85	.980442	.65	.487143	7.50	.512857	56
5	9.467996	6.85	9.980403	.65	9.487593	7.50	0.512407	55
6	.468407	6.83	.980364	.65	.488043	7.48	.511957	54
7	.468817	6.83	.980325	.65	.488492	7.48	.511508	53
8	.469227	6.83	.980286	.65	.488941	7.48	.511059	52
9	.469637	6.82	.980247	.65	.489390	7.47	.510610	51
10	9.470046	6.82	9.980208	.65	9.489838	7.47	0.510162	50
11	.470455	6.80	.980169	.65	.490286	7.45	.509714	49
12	.470863	6.80	.980130	.65	.490733	7.45	.509267	48
13	.471271	6.80	.980091	.65	.491180	7.45	.508820	47
14	.471679	6.78	.980052	.67	.491627	7.43	.508373	46
15	9.472086	6.77	9.980012	.65	9.492073	7.43	0.507927	45
16	.472492	6.77	.979973	.65	.492519	7.43	.507481	44
17	.472898	6.77	.979934	.65	.492965	7.42	.507035	43
18	.473304	6.77	.979895	.67	.493410	7.40	.506590	42
19	.473710	6.75	.979855	.65	.493854	7.42	.506146	41
20	9.474115	6.73	9.979816	.67	9.494299	7.40	0.505701	40
21	.474519	6.73	.979776	.65	.494743	7.38	.505257	39
22	.474923	6.73	.979737	.67	.495186	7.40	.504814	38
23	.475327	6.72	.979697	.65	.495630	7.38	.504370	37
24	.475730	6.72	.979658	.67	.496073	7.37	.503927	36
25	9.476133	6.72	9.979618	.65	9.496515	7.37	0.503485	35
26	.476536	6.70	.979579	.67	.496957	7.37	.503043	34
27	.476938	6.70	.979539	.67	.497399	7.37	.502601	33
28	.477340	6.68	.979499	.67	.497841	7.35	.502159	32
29	.477741	6.68	.979459	.65	.498282	7.33	.501718	31
30	9.478142	6.67	9.979420	.67	9.498722	7.35	0.501278	30
31	.478542	6.67	.979380	.67	.499163	7.33	.500837	29
32	.478942	6.67	.979340	.67	.499603	7.32	.500397	28
33	.479342	6.65	.979300	.67	.500042	7.32	.499958	27
34	.479741	6.65	.979260	.67	.500481	7.32	.499519	26
35	9.480140	6.65	9.979220	.67	9.500920	7.32	0.499080	25
36	.480539	6.63	.979180	.67	.501359	7.30	.498641	24
37	.480937	6.62	.979140	.67	.501797	7.30	.498203	23
38	.481334	6.62	.979100	.68	.502235	7.28	.497765	22
39	.481731	6.62	.979059	.67	.502672	7.28	.497328	21
40	9.482128	6.62	9.979019	.67	9.503109	7.28	0.496891	20
41	.482525	6.60	.978979	.67	.503546	7.27	.496454	19
42	.482921	6.58	.978939	.68	.503982	7.27	.496018	18
43	.483316	6.60	.978898	.67	.504418	7.27	.495582	17
44	.483712	6.58	.978858	.68	.504854	7.25	.495146	16
45	9.484107	6.57	9.978817	.67	9.505289	7.25	0.494711	15
46	.484501	6.57	.978777	.67	.505724	7.25	.494276	14
47	.484895	6.57	.978737	.68	.506159	7.23	.493841	13
48	.485289	6.55	.978696	.68	.506593	7.23	.493407	12
49	.485682	6.55	.978655	.67	.507027	7.22	.492973	11
50	9.486075	6.53	9.978615	.68	9.507460	7.22	0.492540	10
51	.486467	6.55	.978574	.68	.507893	7.22	.492107	9
52	.486860	6.52	.978533	.67	.508326	7.22	.491674	8
53	.487251	6.53	.978493	.68	.508759	7.20	.491241	7
54	.487643	6.52	.978452	.68	.509191	7.18	.490809	6
55	9.488034	6.50	9.978411	.68	9.509622	7.20	0.490378	5
56	.488424	6.50	.978370	.68	.510054	7.18	.489946	4
57	.488814	6.50	.978329	.68	.510485	7.18	.489515	3
58	.489204	6.48	.978288	.68	.510916	7.17	.489084	2
59	.489593	6.48	.978247	.68	.511346	7.17	.488654	1
60	9.489982		9.978206		9.511776		0.488224	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.489982	6.48	9.978206	.68	9.511776	7.17	0.488224	60
1	.490371	6.47	.978165	.68	.512206	7.15	.487794	59
2	.490759	6.47	.978124	.68	.512635	7.15	.487365	58
3	.491147	6.47	.978083	.68	.513064	7.15	.486936	57
4	.491535	6.45	.978042	.68	.513493	7.13	.486507	56
5	9.491922	6.43	9.978001	.70	9.513921	7.13	0.486079	55
6	.492308	6.45	.977959	.68	.514349	7.13	.485651	54
7	.492695	6.43	.977918	.68	.514777	7.12	.485223	53
8	.493081	6.42	.977877	.70	.515204	7.12	.484796	52
9	.493466	6.42	.977835	.68	.515631	7.10	.484369	51
10	9.493851	6.42	9.977794	.70	9.516057	7.12	0.483943	50
11	.494236	6.42	.977752	.68	.516484	7.10	.483516	49
12	.494621	6.40	.977711	.70	.516910	7.08	.483090	48
13	.495005	6.38	.977669	.68	.517335	7.10	.482665	47
14	.495388	6.40	.977628	.70	.517761	7.08	.482239	46
15	9.495772	6.37	9.977586	.70	9.518186	7.07	0.481814	45
16	.496154	6.38	.977544	.68	.518610	7.07	.481390	44
17	.496537	6.37	.977503	.70	.519034	7.07	.480966	43
18	.496919	6.37	.977461	.70	.519458	7.07	.480542	42
19	.497301	6.35	.977419	.70	.519882	7.05	.480118	41
20	9.497682	6.37	9.977377	.70	9.520305	7.05	0.479695	40
21	.498064	6.33	.977335	.70	.520728	7.05	.479272	39
22	.498444	6.35	.977293	.70	.521151	7.03	.478849	38
23	.498825	6.32	.977251	.70	.521573	7.03	.478427	37
24	.499204	6.33	.977209	.70	.521995	7.03	.478005	36
25	9.499584	6.32	9.977167	.70	9.522417	7.02	0.477583	35
26	.499963	6.32	.977125	.70	.522838	7.02	.477162	34
27	.500342	6.32	.977083	.70	.523259	7.02	.476741	33
28	.500721	6.30	.977041	.70	.523680	7.00	.476320	32
29	.501099	6.28	.976999	.70	.524100	7.00	.475900	31
30	9.501476	6.30	9.976957	.72	9.524520	7.00	0.475480	30
31	.501854	6.28	.976914	.70	.524940	6.98	.475060	29
32	.502231	6.27	.976872	.70	.525359	6.98	.474641	28
33	.502607	6.28	.976830	.72	.525778	6.98	.474222	27
34	.502984	6.27	.976787	.70	.526197	6.97	.473803	26
35	9.503360	6.25	9.976745	.72	9.526615	6.97	0.473385	25
36	.503735	6.25	.976702	.70	.527033	6.97	.472967	24
37	.504110	6.25	.976660	.72	.527451	6.95	.472549	23
38	.504485	6.25	.976617	.72	.527868	6.95	.472132	22
39	.504860	6.23	.976574	.70	.528285	6.95	.471715	21
40	9.505234	6.23	9.976532	.72	9.528702	6.95	0.471298	20
41	.505608	6.22	.976489	.72	.529119	6.93	.470881	19
42	.505981	6.22	.976446	.70	.529535	6.93	.470465	18
43	.506354	6.22	.976404	.72	.529951	6.92	.470049	17
44	.506727	6.20	.976361	.72	.530366	6.92	.469634	16
45	9.507099	6.20	9.976318	.72	9.530781	6.92	0.469219	15
46	.507471	6.20	.976275	.72	.531196	6.92	.468804	14
47	.507843	6.18	.976232	.72	.531611	6.90	.468389	13
48	.508214	6.18	.976189	.72	.532025	6.90	.467975	12
49	.508585	6.18	.976146	.72	.532439	6.90	.467561	11
50	9.508956	6.17	9.976103	.72	9.532853	6.88	0.467147	10
51	.509326	6.17	.976060	.72	.533266	6.88	.466734	9
52	.509696	6.15	.976017	.72	.533679	6.88	.466321	8
53	.510065	6.15	.975974	.73	.534092	6.87	.465908	7
54	.510434	6.15	.975930	.72	.534504	6.87	.465496	6
55	9.510803	6.15	9.975887	.72	9.534916	6.87	0.465084	5
56	.511172	6.13	.975844	.73	.535328	6.85	.464672	4
57	.511540	6.12	.975800	.72	.535739	6.85	.464261	3
58	.511907	6.13	.975757	.72	.536150	6.85	.463850	2
59	.512275	6.12	.975714	.73	.536561	6.85	.463439	1
60	9.512642		9.975670		9.536972		0.463028	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.512642	6.12	9.975670	.72	9.536972	6.83	0.463028	60
1	.513009	6.10	.975627	.73	.537382	6.83	.462618	59
2	.513375	6.10	.975583	.73	.537792	6.83	.462208	58
3	.513741	6.10	.975539	.72	.538202	6.82	.461798	57
4	.514107	6.08	.975496	.73	.538611	6.82	.461389	56
5	9.514472	6.08	9.975452	.73	9.539020	6.82	0.460980	55
6	.514837	6.08	.975408	.72	.539429	6.80	.460571	54
7	.515202	6.07	.975365	.73	.539837	6.80	.460163	53
8	.515566	6.07	.975321	.73	.540245	6.80	.459755	52
9	.515930	6.07	.975277	.73	.540653	6.80	.459347	51
10	9.516294	6.05	9.975233	.73	9.541061	6.78	0.458939	50
11	.516657	6.05	.975189	.73	.541468	6.78	.458532	49
12	.517020	6.03	.975145	.73	.541875	6.77	.458125	48
13	.517382	6.05	.975101	.73	.542281	6.78	.457719	47
14	.517745	6.03	.975057	.73	.542688	6.77	.457312	46
15	9.518107	6.02	9.975013	.73	9.543094	6.75	0.456906	45
16	.518468	6.02	.974969	.73	.543499	6.77	.456501	44
17	.518829	6.02	.974925	.75	.543905	6.75	.456095	43
18	.519190	6.02	.974880	.73	.544310	6.75	.455690	42
19	.519551	6.00	.974836	.73	.544715	6.73	.455285	41
20	9.519911	6.00	9.974792	.73	9.545119	6.75	0.454881	40
21	.520271	6.00	.974748	.75	.545524	6.73	.454476	39
22	.520631	5.98	.974703	.73	.545928	6.72	.454072	38
23	.520990	5.98	.974659	.75	.546331	6.73	.453669	37
24	.521349	5.97	.974614	.73	.546735	6.72	.453265	36
25	9.521707	5.98	9.974570	.75	9.547138	6.70	0.452862	35
26	.522066	5.97	.974525	.73	.547540	6.72	.452460	34
27	.522424	5.95	.974481	.75	.547943	6.70	.452057	33
28	.522781	5.95	.974436	.75	.548345	6.70	.451655	32
29	.523138	5.95	.974391	.73	.548747	6.70	.451253	31
30	9.523495	5.95	9.974347	.75	9.549149	6.68	0.450851	30
31	.523852	5.93	.974302	.75	.549550	6.68	.450450	29
32	.524208	5.93	.974257	.75	.549951	6.68	.450049	28
33	.524564	5.93	.974212	.75	.550352	6.67	.449648	27
34	.524920	5.92	.974167	.75	.550752	6.68	.449248	26
35	9.525275	5.92	9.974122	.75	9.551153	6.65	0.448847	25
36	.525630	5.90	.974077	.75	.551552	6.67	.448448	24
37	.525984	5.92	.974032	.75	.551952	6.65	.448048	23
38	.526339	5.90	.973987	.75	.552351	6.65	.447649	22
39	.526693	5.88	.973942	.75	.552750	6.65	.447250	21
40	9.527046	5.90	9.973897	.75	9.553149	6.65	0.446851	20
41	.527400	5.88	.973852	.75	.553548	6.63	.446452	19
42	.527753	5.87	.973807	.77	.553946	6.63	.446054	18
43	.528105	5.88	.973761	.75	.554344	6.62	.445656	17
44	.528458	5.87	.973716	.75	.554741	6.63	.445259	16
45	9.528810	5.85	9.973671	.77	9.555139	6.62	0.444861	15
46	.529161	5.87	.973625	.75	.555536	6.62	.444464	14
47	.529513	5.85	.973580	.75	.555933	6.60	.444067	13
48	.529864	5.85	.973535	.77	.556329	6.60	.443671	12
49	.530215	5.83	.973489	.75	.556725	6.60	.443275	11
50	9.530565	5.83	9.973444	.77	9.557121	6.60	0.442879	10
51	.530915	5.83	.973398	.77	.557517	6.60	.442483	9
52	.531265	5.82	.973352	.75	.557913	6.58	.442087	8
53	.531614	5.82	.973307	.77	.558308	6.58	.441692	7
54	.531963	5.82	.973261	.77	.558703	6.57	.441297	6
55	9.532312	5.82	9.973215	.77	9.559097	6.57	0.440903	5
56	.532661	5.80	.973169	.77	.559491	6.57	.440509	4
57	.533009	5.80	.973124	.75	.559885	6.57	.440115	3
58	.533357	5.78	.973078	.77	.560279	6.57	.439721	2
59	.533704	5.80	.973032	.77	.560673	6.55	.439327	1
60	9.534052		9.972986		9.561066		0.438934	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.534052	5.78	9.972986	.77	9.561066	6.55	0.438934	60
1	.534399	5.77	.972940	.77	.561459	6.53	.438541	59
2	.534745	5.78	.972894	.77	.561851	6.55	.438149	58
3	.535092	5.77	.972848	.77	.562244	6.53	.437756	57
4	.535438	5.75	.972802	.78	.562636	6.53	.437364	56
5	9.535783	5.77	9.972755	.77	9.563028	6.52	0.436972	55
6	.536129	5.75	.972709	.77	.563419	6.53	.436581	54
7	.536474	5.73	.972663	.77	.563811	6.52	.436189	53
8	.536818	5.75	.972617	.78	.564202	6.52	.435798	52
9	.537163	5.73	.972570	.77	.564593	6.50	.435407	51
10	9.537507	5.73	9.972524	.77	9.564983	6.50	0.435017	50
11	.537851	5.72	.972478	.78	.565373	6.50	.434627	49
12	.538194	5.73	.972431	.77	.565763	6.50	.434237	48
13	.538538	5.70	.972385	.78	.566153	6.48	.433847	47
14	.538880	5.72	.972338	.78	.566542	6.50	.433458	46
15	9.539223	5.70	9.972291	.77	9.566932	6.47	0.433068	45
16	.539565	5.70	.972245	.78	.567320	6.48	.432680	44
17	.539907	5.70	.972198	.78	.567709	6.48	.432291	43
18	.540249	5.68	.972151	.77	.568098	6.47	.431902	42
19	.540590	5.68	.972105	.78	.568486	6.45	.431514	41
20	9.540931	5.68	9.972058	.78	9.568873	6.47	0.431127	40
21	.541272	5.68	.972011	.78	.569261	6.45	.430739	39
22	.541613	5.67	.971964	.78	.569648	6.45	.430352	38
23	.541953	5.67	.971917	.78	.570035	6.45	.429965	37
24	.542293	5.65	.971870	.78	.570422	6.45	.429578	36
25	9.542632	5.65	9.971823	.78	9.570809	6.43	0.429191	35
26	.542971	5.65	.971776	.78	.571195	6.43	.428805	34
27	.543310	5.65	.971729	.78	.571581	6.43	.428419	33
28	.543649	5.63	.971682	.78	.571967	6.42	.428033	32
29	.543987	5.63	.971635	.78	.572352	6.43	.427648	31
30	9.544325	5.63	9.971588	.80	9.572738	6.42	0.427262	30
31	.544663	5.62	.971540	.78	.573123	6.40	.426877	29
32	.545000	5.63	.971493	.78	.573507	6.42	.426493	28
33	.545338	5.60	.971446	.80	.573892	6.40	.426108	27
34	.545674	5.62	.971398	.78	.574276	6.40	.425724	26
35	9.546011	5.60	9.971351	.80	9.574660	6.40	0.425340	25
36	.546347	5.60	.971303	.78	.575044	6.38	.424956	24
37	.546683	5.60	.971256	.80	.575427	6.38	.424573	23
38	.547019	5.58	.971208	.78	.575810	6.38	.424190	22
39	.547354	5.58	.971161	.80	.576193	6.38	.423807	21
40	9.547689	5.58	9.971113	.78	9.576576	6.38	0.423424	20
41	.548024	5.58	.971066	.80	.576959	6.37	.423041	19
42	.548359	5.57	.971018	.80	.577341	6.37	.422659	18
43	.548693	5.57	.970970	.80	.577723	6.35	.422277	17
44	.549027	5.55	.970922	.80	.578104	6.37	.421896	16
45	9.549360	5.55	9.970874	.78	9.578486	6.35	0.421514	15
46	.549693	5.55	.970827	.80	.578867	6.35	.421133	14
47	.550026	5.55	.970779	.80	.579248	6.35	.420752	13
48	.550359	5.55	.970731	.80	.579629	6.33	.420371	12
49	.550692	5.53	.970683	.80	.580009	6.33	.419991	11
50	9.551024	5.53	9.970635	.82	9.580389	6.33	0.419611	10
51	.551356	5.52	.970586	.80	.580769	6.33	.419231	9
52	.551687	5.52	.970538	.80	.581149	6.32	.418851	8
53	.552018	5.52	.970490	.80	.581528	6.32	.418472	7
54	.552349	5.52	.970442	.80	.581907	6.32	.418093	6
55	9.552680	5.50	9.970394	.82	9.582286	6.32	0.417714	5
56	.553010	5.52	.970345	.80	.582665	6.32	.417335	4
57	.553341	5.48	.970297	.80	.583044	6.30	.416956	3
58	.553670	5.50	.970249	.82	.583422	6.30	.416578	2
59	.554000	5.48	.970200	.80	.583800	6.28	.416200	1
60	9.554329		9.970152		9.584177		0.415823	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.554329	5.48	9.970152	.82	9.584177	6.30	0.415823	60
1	.554658	5.48	.970103	.80	.584555	6.28	.415445	59
2	.554987	5.47	.970055	.82	.584932	6.28	.415068	58
3	.555315	5.47	.970006	.82	.585309	6.28	.414691	57
4	.555643	5.47	.969957	.80	.585686	6.27	.414314	56
5	9.555971	5.47	9.969909	.82	9.586062	6.28	0.413938	55
6	.556299	5.45	.969860	.82	.586439	6.27	.413561	54
7	.556626	5.45	.969811	.82	.586815	6.25	.413185	53
8	.556953	5.45	.969762	.80	.587190	6.27	.412810	52
9	.557280	5.43	.969714	.82	.587566	6.25	.412434	51
10	9.557606	5.43	9.969665	.82	9.587941	6.25	0.412059	50
11	.557932	5.43	.969616	.82	.588316	6.25	.411684	49
12	.558258	5.42	.969567	.82	.588691	6.25	.411309	48
13	.558583	5.43	.969518	.82	.589066	6.23	.410934	47
14	.558909	5.42	.969469	.82	.589440	6.23	.410560	46
15	9.559234	5.40	9.969420	.83	9.589814	6.23	0.410186	45
16	.559558	5.42	.969370	.82	.590188	6.23	.409812	44
17	.559883	5.40	.969321	.82	.590562	6.22	.409438	43
18	.560207	5.40	.969272	.82	.590935	6.22	.409065	42
19	.560531	5.40	.969223	.83	.591308	6.22	.408692	41
20	9.560855	5.38	9.969173	.82	9.591681	6.22	0.408319	40
21	.561178	5.38	.969124	.82	.592054	6.20	.407946	39
22	.561501	5.38	.969075	.83	.592426	6.22	.407574	38
23	.561824	5.37	.969025	.82	.592799	6.20	.407201	37
24	.562146	5.37	.968976	.83	.593171	6.18	.406829	36
25	9.562468	5.37	9.968926	.82	9.593542	6.20	0.406458	35
26	.562790	5.37	.968877	.83	.593914	6.18	.406086	34
27	.563112	5.35	.968827	.83	.594285	6.18	.405715	33
28	.563433	5.37	.968777	.82	.594656	6.18	.405344	32
29	.563755	5.33	.968728	.83	.595027	6.18	.404973	31
30	9.564075	5.35	9.968678	.83	9.595398	6.17	0.404602	30
31	.564396	5.33	.968628	.83	.595768	6.17	.404232	29
32	.564716	5.33	.968578	.83	.596138	6.17	.403862	28
33	.565036	5.33	.968528	.82	.596508	6.17	.403492	27
34	.565356	5.33	.968479	.83	.596878	6.15	.403122	26
35	9.565676	5.32	9.968429	.83	9.597247	6.15	0.402753	25
36	.565995	5.32	.968379	.83	.597616	6.15	.402384	24
37	.566314	5.30	.968329	.85	.597985	6.15	.402015	23
38	.566632	5.32	.968278	.83	.598354	6.13	.401646	22
39	.566951	5.30	.968228	.83	.598722	6.15	.401278	21
40	9.567269	5.30	9.968178	.83	9.599091	6.13	0.400909	20
41	.567587	5.28	.968128	.83	.599459	6.13	.400541	19
42	.567904	5.30	.968078	.85	.599827	6.12	.400173	18
43	.568222	5.28	.968027	.83	.600194	6.13	.399806	17
44	.568539	5.28	.967977	.83	.600562	6.12	.399438	16
45	9.568856	5.27	9.967927	.85	9.600929	6.12	0.399071	15
46	.569172	5.27	.967876	.83	.601296	6.12	.398704	14
47	.569488	5.27	.967826	.85	.601663	6.10	.398337	13
48	.569804	5.27	.967775	.83	.602029	6.10	.397971	12
49	.570120	5.25	.967725	.85	.602395	6.10	.397605	11
50	9.570435	5.27	9.967674	.83	9.602761	6.10	0.397239	10
51	.570751	5.25	.967624	.85	.603127	6.10	.396873	9
52	.571066	5.23	.967573	.85	.603493	6.08	.396507	8
53	.571380	5.25	.967522	.85	.603858	6.08	.396142	7
54	.571695	5.23	.967471	.83	.604223	6.08	.395777	6
55	9.572009	5.23	9.967421	.85	9.604588	6.08	0.395412	5
56	.572323	5.22	.967370	.85	.604953	6.07	.395047	4
57	.572636	5.23	.967319	.85	.605317	6.08	.394683	3
58	.572950	5.22	.967268	.85	.605682	6.07	.394318	2
59	.573263	5.20	.967217	.85	.606046	6.07	.393954	1
60	9.573575		9.967166		9.606410		0.393590	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.573575	5.22	9.967166	.85	9.606410	6.05	0.393590	60
1	.573888	5.20	.967115	.85	.606773	6.07	.393227	59
2	.574200	5.20	.967064	.85	.607137	6.05	.392863	58
3	.574512	5.20	.967013	.87	.607500	6.05	.392500	57
4	.574824	5.20	.966961	.85	.607863	6.03	.392137	56
5	9.575136	5.18	9.966910	.85	9.608225	6.05	0.391775	55
6	.575447	5.18	.966859	.85	.608588	6.03	.391412	54
7	.575758	5.18	.966808	.87	.608950	6.03	.391050	53
8	.576069	5.17	.966756	.85	.609312	6.03	.390688	52
9	.576379	5.17	.966705	.87	.609674	6.03	.390326	51
10	9.576689	5.17	9.966653	.85	9.610036	6.02	0.389964	50
11	.576999	5.17	.966602	.87	.610397	6.03	.389603	49
12	.577309	5.15	.966550	.85	.610759	6.02	.389241	48
13	.577618	5.15	.966499	.87	.611120	6.00	.388880	47
14	.577927	5.15	.966447	.87	.611480	6.02	.388520	46
15	9.578236	5.15	9.966395	.85	9.611841	6.00	0.388159	45
16	.578545	5.13	.966344	.87	.612201	6.00	.387799	44
17	.578853	5.15	.966292	.87	.612561	6.00	.387439	43
18	.579162	5.13	.966240	.87	.612921	6.00	.387079	42
19	.579470	5.12	.966188	.87	.613281	6.00	.386719	41
20	9.579777	5.13	9.966136	.85	9.613641	5.98	0.386359	40
21	.580085	5.12	.966085	.87	.614000	5.98	.386000	39
22	.580392	5.12	.966033	.87	.614359	5.98	.385641	38
23	.580699	5.10	.965981	.87	.614718	5.98	.385282	37
24	.581005	5.12	.965929	.88	.615077	5.97	.384923	36
25	9.581312	5.10	9.965876	.87	9.615435	5.97	0.384565	35
26	.581618	5.10	.965824	.87	.615793	5.97	.384207	34
27	.581924	5.08	.965772	.87	.616151	5.97	.383849	33
28	.582229	5.10	.965720	.87	.616509	5.97	.383491	32
29	.582535	5.08	.965668	.88	.616867	5.95	.383133	31
30	9.582840	5.08	9.965615	.87	9.617224	5.97	0.382776	30
31	.583145	5.07	.965563	.87	.617582	5.95	.382418	29
32	.583449	5.08	.965511	.88	.617939	5.93	.382061	28
33	.583754	5.07	.965458	.87	.618295	5.95	.381705	27
34	.584058	5.05	.965406	.88	.618652	5.93	.381348	26
35	9.584361	5.07	9.965353	.87	9.619008	5.93	0.380992	25
36	.584665	5.05	.965301	.88	.619364	5.93	.380636	24
37	.584968	5.07	.965248	.88	.619720	5.93	.380280	23
38	.585272	5.03	.965195	.87	.620076	5.93	.379924	22
39	.585574	5.05	.965143	.88	.620432	5.92	.379568	21
40	9.585877	5.03	9.965090	.88	9.620787	5.92	0.379213	20
41	.586179	5.05	.965037	.88	.621142	5.92	.378858	19
42	.586482	5.02	.964984	.88	.621497	5.92	.378503	18
43	.586783	5.03	.964931	.87	.621852	5.92	.378148	17
44	.587085	5.02	.964879	.88	.622207	5.90	.377793	16
45	9.587386	5.03	9.964826	.88	9.622561	5.90	0.377439	15
46	.587688	5.02	.964773	.88	.622915	5.90	.377085	14
47	.587989	5.00	.964720	.90	.623269	5.90	.376731	13
48	.588289	5.02	.964666	.88	.623623	5.88	.376377	12
49	.588590	5.00	.964613	.88	.623976	5.90	.376024	11
50	9.588890	5.00	9.964560	.88	9.624330	5.88	0.375670	10
51	.589190	4.98	.964507	.88	.624683	5.88	.375317	9
52	.589489	5.00	.964454	.90	.625036	5.87	.374964	8
53	.589789	4.98	.964400	.88	.625388	5.88	.374612	7
54	.590088	4.98	.964347	.88	.625741	5.87	.374259	6
55	9.590387	4.98	9.964294	.90	9.626093	5.87	0.373907	5
56	.590686	4.97	.964240	.88	.626445	5.87	.373555	4
57	.590984	4.97	.964187	.90	.626797	5.87	.373203	3
58	.591282	4.97	.964133	.88	.627149	5.87	.372851	2
59	.591580	4.97	.964080	.90	.627501	5.85	.372499	1
60	9.591878		9.964026		9.627852		0.372148	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

112° 67°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.591878	4.97	9.964026	.90	9.627852	5.85	0.372148	60
1	.592176	4.95	.963972	.88	.628203	5.85	.371797	59
2	.592473	4.95	.963919	.90	.628554	5.85	.371446	58
3	.592770	4.95	.963865	.90	.628905	5.83	.371095	57
4	.593067	4.93	.963811	.90	.629255	5.85	.370745	56
5	9.593363	4.93	9.963757	.88	9.629606	5.83	0.370394	55
6	.593659	4.93	.963704	.90	.629956	5.83	.370044	54
7	.593955	4.93	.963650	.90	.630306	5.83	.369694	53
8	.594251	4.93	.963596	.90	.630656	5.82	.369344	52
9	.594547	4.92	.963542	.90	.631005	5.83	.368995	51
10	9.594842	4.92	9.963488	.90	9.631355	5.82	0.368645	50
11	.595137	4.92	.963434	.92	.631704	5.82	.368296	4
12	.595432	4.92	.963379	.90	.632053	5.82	.367947	4
13	.595727	4.90	.963325	.90	.632402	5.80	.367598	47
14	.596021	4.90	.963271	.90	.632750	5.82	.367250	4
15	9.596315	4.90	9.963217	.90	9.633099	5.80	0.366901	4
16	.596609	4.90	.963163	.92	.633447	5.80	.366553	4
17	.596903	4.88	.963108	.90	.633795	5.80	.366205	4
18	.597196	4.90	.963054	.92	.634143	5.78	.365857	4
19	.597490	4.88	.962999	.90	.634490	5.80	.365510	4
20	9.597783	4.87	9.962945	.92	9.634838	5.78	0.365162	4
21	.598075	4.88	.962890	.90	.635185	5.78	.364815	3
22	.598368	4.87	.962836	.92	.635532	5.78	.364468	3
23	.598660	4.87	.962781	.90	.635879	5.78	.364121	3
24	.598952	4.87	.962727	.92	.636226	5.77	.363774	3
25	9.599244	4.87	9.962672	.92	9.636572	5.78	0.363428	3
26	.599536	4.85	.962617	.92	.636919	5.77	.363081	3
27	.599827	4.85	.962562	.90	.637265	5.77	.362735	3
28	.600118	4.85	.962508	.92	.637611	5.75	.362389	3
29	.600409	4.85	.962453	.92	.637956	5.77	.362044	3
30	9.600700	4.83	9.962398	.92	9.638302	5.75	0.361698	3
31	.600990	4.83	.962343	.92	.638647	5.75	.361353	2
32	.601280	4.83	.962288	.92	.638992	5.75	.361008	2
33	.601570	4.83	.962233	.92	.639337	5.75	.360663	2
34	.601860	4.83	.962178	.92	.639682	5.75	.360318	2
35	9.602150	4.82	9.962123	.93	9.640027	5.73	0.359973	2
36	.602439	4.82	.962067	.92	.640371	5.75	.359629	2
37	.602728	4.82	.962012	.92	.640716	5.73	.359284	2
38	.603017	4.80	.961957	.92	.641060	5.73	.358940	2
39	.603305	4.82	.961902	.93	.641404	5.72	.358596	2
40	9.603594	4.80	9.961846	.92	9.641747	5.73	0.358253	2
41	.603882	4.80	.961791	.93	.642091	5.72	.357909	1
42	.604170	4.78	.961735	.92	.642434	5.72	.357566	1
43	.604457	4.80	.961680	.93	.642777	5.72	.357223	1
44	.604745	4.78	.961624	.92	.643120	5.72	.356880	1
45	9.605032	4.78	9.961569	.93	9.643463	5.72	0.356537	1
46	.605319	4.78	.961513	.92	.643806	5.70	.356194	1
47	.605606	4.77	.961458	.93	.644148	5.70	.355852	1
48	.605892	4.78	.961402	.93	.644490	5.70	.355510	1
49	.606179	4.77	.961346	.93	.644832	5.70	.355168	1
50	9.606465	4.77	9.961290	.92	9.645174	5.70	0.354826	1
51	.606751	4.75	.961235	.93	.645516	5.68	.354484	
52	.607036	4.77	.961179	.93	.645857	5.70	.354143	
53	.607322	4.75	.961123	.93	.646199	5.68	.353801	
54	.607607	4.75	.961067	.93	.646540	5.68	.353460	
55	9.607892	4.75	9.961011	.93	9.646881	5.68	0.353119	
56	.608177	4.73	.960955	.93	.647222	5.67	.352778	
57	.608461	4.73	.960899	.93	.647562	5.68	.352438	
58	.608745	4.73	.960843	.95	.647903	5.67	.352097	
59	.609029	4.73	.960786	.93	.648243	5.67	.351757	
60	9.609313		9.960730		9.648583		0.351417	
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	I

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.609313	4.73	9.960730	.93	9.648583	5.67	0.351417	60
1	.609597	4.72	.960674	.93	.648923	5.67	.351077	59
2	.609880	4.73	.960618	.95	.649263	5.65	.350737	58
3	.610164	4.72	.960561	.93	.649602	5.67	.350398	57
4	.610447	4.70	.960505	.95	.649942	5.65	.350058	56
5	9.610729	4.72	9.960448	.93	9.650281	5.65	0.349719	55
6	.611012	4.70	.960392	.95	.650620	5.65	.349380	54
7	.611294	4.70	.960335	.93	.650959	5.63	.349041	53
8	.611576	4.70	.960279	.95	.651297	5.65	.348703	52
9	.611858	4.70	.960222	.95	.651636	5.63	.348364	51
10	9.612140	4.68	9.960165	.93	9.651974	5.63	0.348026	50
11	.612421	4.68	.960109	.95	.652312	5.63	.347688	49
12	.612702	4.68	.960052	.95	.652650	5.63	.347350	48
13	.612983	4.68	.959995	.95	.652988	5.63	.347012	47
14	.613264	4.68	.959938	.93	.653326	5.62	.346674	46
15	9.613545	4.67	9.959882	.95	9.653663	5.62	0.346337	45
16	.613825	4.67	.959825	.95	.654000	5.62	.346000	44
17	.614105	4.67	.959768	.95	.654337	5.62	.345663	43
18	.614385	4.67	.959711	.95	.654674	5.62	.345326	42
19	.614665	4.65	.959654	.97	.655011	5.62	.344989	41
20	9.614944	4.65	9.959596	.95	9.655348	5.60	0.344652	40
21	.615223	4.65	.959539	.95	.655684	5.60	.344316	39
22	.615502	4.65	.959482	.95	.656020	5.60	.343980	38
23	.615781	4.65	.959425	.95	.656356	5.60	.343644	37
24	.616060	4.63	.959368	.97	.656692	5.60	.343308	36
25	9.616338	4.63	9.959310	.95	9.657028	5.60	0.342972	35
26	.616616	4.63	.959253	.97	.657364	5.58	.342636	34
27	.616894	4.63	.959195	.95	.657699	5.58	.342301	33
28	.617172	4.63	.959138	.97	.658034	5.58	.341966	32
29	.617450	4.62	.959080	.95	.658369	5.58	.341631	31
30	9.617727	4.62	9.959023	.97	9.658704	5.58	0.341296	30
31	.618004	4.62	.958965	.95	.659039	5.57	.340961	29
32	.618281	4.62	.958908	.97	.659373	5.58	.340627	28
33	.618558	4.60	.958850	.97	.659708	5.57	.340292	27
34	.618834	4.60	.958792	.97	.660042	5.57	.339958	26
35	9.619110	4.60	9.958734	.95	9.660376	5.57	0.339624	25
36	.619386	4.60	.958677	.97	.660710	5.55	.339290	24
37	.619662	4.60	.958619	.97	.661043	5.57	.338957	23
38	.619938	4.58	.958561	.97	.661377	5.55	.338623	22
39	.620213	4.58	.958503	.97	.661710	5.55	.338290	21
40	9.620488	4.58	9.958445	.97	9.662043	5.55	0.337957	20
41	.620763	4.58	.958387	.97	.662376	5.55	.337624	19
42	.621038	4.58	.958329	.97	.662709	5.55	.337291	18
43	.621313	4.57	.958271	.97	.663042	5.55	.336958	17
44	.621587	4.57	.958213	.98	.663375	5.53	.336625	16
45	9.621861	4.57	9.958154	.97	9.663707	5.53	0.336293	15
46	.622135	4.57	.958096	.97	.664039	5.53	.335961	14
47	.622409	4.55	.958038	.98	.664371	5.53	.335629	13
48	.622682	4.57	.957979	.97	.664703	5.53	.335297	12
49	.622956	4.55	.957921	.97	.665035	5.52	.334965	11
50	9.623229	4.55	9.957863	.98	9.665366	5.53	0.334634	10
51	.623502	4.53	.957804	.97	.665698	5.52	.334302	9
52	.623774	4.55	.957746	.98	.666029	5.52	.333971	8
53	.624047	4.53	.957687	.98	.666360	5.52	.333640	7
54	.624319	4.53	.957628	.97	.666691	5.50	.333309	6
55	9.624591	4.53	9.957570	.98	9.667021	5.52	0.332979	5
56	.624863	4.53	.957511	.98	.667352	5.50	.332648	4
57	.625135	4.52	.957452	.98	.667682	5.52	.332318	3
58	.625406	4.52	.957393	.97	.668013	5.50	.331987	2
59	.625677	4.52	.957335	.98	.668343	5.50	.331657	1
60	9.625948		9.957276		9.668673		0.331327	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

25° **TABLE XIII.—LOGARITHMIC SINES,** 154°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.625948	4.52	9.957276	.98	9.668673	5.48	0.331327	60
1	.626219	4.52	.957217	.98	.669002	5.50	.330998	59
2	.626490	4.50	.957158	.98	.669332	5.48	.330668	58
3	.626760	4.50	.957099	.98	.669661	5.50	.330339	57
4	.627030	4.50	.957040	.98	.669991	5.48	.330009	56
5	9.627300	4.50	9.956981	1.00	9.670320	5.48	0.329680	55
6	.627570	4.50	.956921	.98	.670649	5.47	.329351	54
7	.627840	4.48	.956862	.98	.670977	5.48	.329023	53
8	.628109	4.48	.956803	.98	.671306	5.48	.328694	52
9	.628378	4.48	.956744	1.00	.671635	5.47	.328365	51
10	9.628647	4.48	9.956684	.98	9.671963	5.47	0.328037	50
11	.628916	4.48	.956625	.98	.672291	5.47	.327709	49
12	.629185	4.47	.956566	1.00	.672619	5.47	.327381	48
13	.629453	4.47	.956506	.98	.672947	5.45	.327053	47
14	.629721	4.47	.956447	1.00	.673274	5.47	.326726	46
15	9.629989	4.47	9.956387	1.00	9.673602	5.45	0.326398	45
16	.630257	4.45	.956327	.98	.673929	5.47	.326071	44
17	.630524	4.47	.956268	1.00	.674257	5.45	.325743	43
18	.630792	4.45	.956208	1.00	.674584	5.45	.325416	42
19	.631059	4.45	.956148	.98	.674911	5.43	.325089	41
20	9.631326	4.45	9.956089	1.00	9.675237	5.45	0.324763	40
21	.631593	4.43	.956029	1.00	.675564	5.43	.324436	39
22	.631859	4.43	.955969	1.00	.675890	5.45	.324110	38
23	.632125	4.45	.955909	1.00	.676217	5.43	.323783	37
24	.632392	4.43	.955849	1.00	.676543	5.43	.323457	36
25	9.632658	4.42	9.955789	1.00	9.676869	5.42	0.323131	35
26	.632923	4.43	.955729	1.00	.677194	5.43	.322806	34
27	.633189	4.42	.955669	1.00	.677520	5.43	.322480	33
28	.633454	4.42	.955609	1.02	.677846	5.42	.322154	32
29	.633719	4.42	.955548	1.00	.678171	5.42	.321829	31
30	9.633984	4.42	9.955488	1.00	9.678496	5.42	0.321504	30
31	.634249	4.42	.955428	1.00	.678821	5.42	.321179	29
32	.634514	4.40	.955368	1.02	.679146	5.42	.320854	28
33	.634778	4.40	.955307	1.00	.679471	5.40	.320529	27
34	.635042	4.40	.955247	1.02	.679795	5.42	.320205	26
35	9.635306	4.40	9.955186	1.00	9.680120	5.40	0.319880	25
36	.635570	4.40	.955126	1.02	.680444	5.40	.319556	24
37	.635834	4.38	.955065	1.00	.680768	5.40	.319232	23
38	.636097	4.38	.955005	1.02	.681092	5.40	.318908	22
39	.636360	4.38	.954944	1.02	.681416	5.40	.318584	21
40	9.636623	4.38	9.954883	1.00	9.681740	5.38	0.318260	20
41	.636886	4.37	.954823	1.02	.682063	5.40	.317937	19
42	.637148	4.38	.954762	1.02	.682387	5.38	.317613	18
43	.637411	4.37	.954701	1.02	.682710	5.38	.317290	17
44	.637673	4.37	.954640	1.02	.683033	5.38	.316967	16
45	9.637935	4.37	9.954579	1.02	9.683356	5.38	0.316644	15
46	.638197	4.35	.954518	1.02	.683679	5.37	.316321	14
47	.638458	4.37	.954457	1.02	.684001	5.38	.315999	13
48	.638720	4.35	.954396	1.02	.684324	5.37	.315676	12
49	.638981	4.35	.954335	1.02	.684646	5.37	.315354	11
50	9.639242	4.35	9.954274	1.02	9.684968	5.37	0.315032	10
51	.639503	4.35	.954213	1.02	.685290	5.37	.314710	9
52	.639764	4.33	.954152	1.03	.685612	5.37	.314388	8
53	.640024	4.33	.954090	1.02	.685934	5.35	.314066	7
54	.640284	4.33	.954029	1.02	.686255	5.37	.313745	6
55	9.640544	4.33	9.953968	1.03	9.686577	5.35	0.313423	5
56	.640804	4.33	.953906	1.02	.686898	5.35	.313102	4
57	.641064	4.33	.953845	1.03	.687219	5.35	.312781	3
58	.641324	4.32	.953783	1.02	.687540	5.35	.312460	2
59	.641583	4.32	.953722	1.03	.687861	5.35	.312139	1
60	9.641842		9.953660		9.688182		0.311818	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

115° 64°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.641842	4.32	9.953660	1.02	9.688182	5.33	0.311818	60
1	.642101	4.32	.953599	1.03	.688502	5.35	.311498	59
2	.642360	4.30	.953537	1.03	.688823	5.33	.311177	58
3	.642618	4.32	.953475	1.03	.689143	5.33	.310857	57
4	.642877	4.30	.953413	1.02	.689463	5.33	.310537	56
5	9.643135	4.30	9.953352	1.03	9.689783	5.33	0.310217	55
6	.643393	4.28	.953290	1.03	.690103	5.33	.309897	54
7	.643650	4.30	.953228	1.03	.690423	5.32	.309577	53
8	.643908	4.28	.953166	1.03	.690742	5.33	.309258	52
9	.644165	4.30	.953104	1.03	.691062	5.32	.308938	51
10	9.644423	4.28	9.953042	1.03	9.691381	5.32	0.308619	50
11	.644680	4.27	.952980	1.03	.691700	5.32	.308300	49
12	.644936	4.28	.952918	1.05	.692019	5.32	.307981	48
13	.645193	4.28	.952855	1.03	.692338	5.30	.307662	47
14	.645450	4.27	.952793	1.03	.692656	5.32	.307344	46
15	9.645706	4.27	9.952731	1.03	9.692975	5.30	0.307025	45
16	.645962	4.27	.952669	1.05	.693293	5.32	.306707	44
17	.646218	4.27	.952606	1.03	.693612	5.30	.306388	43
18	.646474	4.25	.952544	1.05	.693930	5.30	.306070	42
19	.646729	4.25	.952481	1.03	.694248	5.30	.305752	41
20	9.646984	4.27	9.952419	1.05	9.694566	5.28	0.305434	40
21	.647240	4.23	.952356	1.03	.694883	5.30	.305117	39
22	.647494	4.25	.952294	1.05	.695201	5.28	.304799	38
23	.647749	4.25	.952231	1.05	.695518	5.30	.304482	37
24	.648004	4.23	.952168	1.03	.695836	5.28	.304164	36
25	9.648258	4.23	9.952106	1.05	9.696153	5.28	0.303847	35
26	.648512	4.23	.952043	1.05	.696470	5.28	.303530	34
27	.648766	4.23	.951980	1.05	.696787	5.27	.303213	33
28	.649020	4.23	.951917	1.05	.697103	5.28	.302897	32
29	.649274	4.22	.951854	1.05	.697420	5.27	.302580	31
30	9.649527	4.23	9.951791	1.05	9.697736	5.28	0.302264	30
31	.649781	4.22	.951728	1.05	.698053	5.27	.301947	29
32	.650034	4.22	.951665	1.05	.698369	5.27	.301631	28
33	.650287	4.20	.951602	1.05	.698685	5.27	.301315	27
34	.650539	4.22	.951539	1.05	.699001	5.25	.300999	26
35	9.650792	4.20	9.951476	1.07	9.699316	5.27	0.300684	25
36	.651044	4.22	.951412	1.05	.699632	5.25	.300368	24
37	.651297	4.20	.951349	1.05	.699947	5.27	.300053	23
38	.651549	4.18	.951286	1.07	.700263	5.25	.299737	22
39	.651800	4.20	.951222	1.05	.700578	5.25	.299422	21
40	9.652052	4.20	9.951159	1.05	9.700893	5.25	0.299107	20
41	.652304	4.18	.951096	1.07	.701208	5.25	.298792	19
42	.652555	4.18	.951032	1.07	.701523	5.23	.298477	18
43	.652806	4.18	.950968	1.05	.701837	5.25	.298163	17
44	.653057	4.18	.950905	1.07	.702152	5.23	.297848	16
45	9.653308	4.17	9.950841	1.05	9.702466	5.25	0.297534	15
46	.653558	4.17	.950778	1.07	.702781	5.23	.297219	14
47	.653808	4.18	.950714	1.07	.703095	5.23	.296905	13
48	.654059	4.17	.950650	1.07	.703409	5.22	.296591	12
49	.654309	4.15	.950586	1.07	.703722	5.23	.296278	11
50	9.654558	4.17	9.950522	1.07	9.704036	5.23	0.295964	10
51	.654808	4.17	.950458	1.07	.704350	5.22	.295650	9
52	.655058	4.15	.950394	1.07	.704663	5.22	.295337	8
53	.655307	4.15	.950330	1.07	.704976	5.23	.295024	7
54	.655556	4.15	.950266	1.07	.705290	5.22	.294710	6
55	9.655805	4.15	9.950202	1.07	9.705603	5.22	0.294397	5
56	.656054	4.13	.950138	1.07	.705916	5.20	.294084	4
57	.656302	4.15	.950074	1.07	.706228	5.22	.293772	3
58	.656551	4.13	.950010	1.08	.706541	5.22	.293459	2
59	.656799	4.13	.949945	1.07	.706854	5.20	.293146	1
60	9.657047		9.949881		9.707166		0.292834	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

27° TABLE XIII.—LOGARITHMIC SINES, 152°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.657047	4.13	9.949881	1.08	9.707166	5.20	0.292834	60
1	.657295	4.12	.949816	1.07	.707478	5.20	.292522	59
2	.657542	4.13	.949752	1.07	.707790	5.20	.292210	58
3	.657790	4.12	.949688	1.08	.708102	5.20	.291898	57
4	.658037	4.12	.949623	1.08	.708414	5.20	.291586	56
5	9.658284	4.12	9.949558	1.07	9.708726	5.18	0.291274	55
6	.658531	4.12	.949494	1.08	.709037	5.20	.290963	54
7	.658778	4.12	.949429	1.08	.709349	5.18	.290651	53
8	.659025	4.10	.949364	1.07	.709660	5.18	.290340	52
9	.659271	4.10	.949300	1.08	.709971	5.18	.290029	51
10	9.659517	4.10	9.949235	1.08	9.710282	5.18	0.289718	50
11	.659763	4.10	.949170	1.08	.710593	5.18	.289407	49
12	.660009	4.10	.949105	1.08	.710904	5.18	.289096	48
13	.660255	4.10	.949040	1.08	.711215	5.17	.288785	47
14	.660501	4.08	.948975	1.08	.711525	5.18	.288475	46
15	9.660746	4.08	9.948910	1.08	9.711836	5.17	0.288164	45
16	.660991	4.08	.948845	1.08	.712146	5.17	.287854	44
17	.661236	4.08	.948780	1.08	.712456	5.17	.287544	43
18	.661481	4.08	.948715	1.08	.712766	5.17	.287234	42
19	.661726	4.07	.948650	1.10	.713076	5.17	.286924	41
20	9.661970	4.07	9.948584	1.08	9.713386	5.17	0.286614	40
21	.662214	4.08	.948519	1.08	.713696	5.15	.286304	39
22	.662459	4.07	.948454	1.10	.714005	5.15	.285995	38
23	.662703	4.05	.948388	1.08	.714314	5.17	.285686	37
24	.662946	4.07	.948323	1.10	.714624	5.15	.285376	36
25	9.663190	4.05	9.948257	1.08	9.714933	5.15	0.285067	35
26	.663433	4.07	.948192	1.10	.715242	5.15	.284758	34
27	.663677	4.05	.948126	1.10	.715551	5.15	.284449	33
28	.663920	4.05	.948060	1.08	.715860	5.13	.284140	32
29	.664163	4.05	.947995	1.10	.716168	5.15	.283832	31
30	9.664406	4.03	9.947929	1.10	9.716477	5.13	0.283523	30
31	.664648	4.05	.947863	1.10	.716785	5.13	.283215	29
32	.664891	4.03	.947797	1.10	.717093	5.13	.282907	28
33	.665133	4.03	.947731	1.10	.717401	5.13	.282599	27
34	.665375	4.03	.947665	1.08	.717709	5.13	.282291	26
35	9.665617	4.03	9.947600	1.12	9.718017	5.13	0.281983	25
36	.665859	4.02	.947533	1.10	.718325	5.13	.281675	24
37	.666100	4.03	.947467	1.10	.718633	5.12	.281367	23
38	.666342	4.02	.947401	1.10	.718940	5.13	.281060	22
39	.666583	4.02	.947335	1.10	.719248	5.12	.280752	21
40	9.666824	4.02	9.947269	1.10	9.719555	5.12	0.280445	20
41	.667065	4.00	.947203	1.12	.719862	5.12	.280138	19
42	.667305	4.02	.947136	1.10	.720169	5.12	.279831	18
43	.667546	4.00	.947070	1.10	.720476	5.12	.279524	17
44	.667786	4.02	.947004	1.12	.720783	5.10	.279217	16
45	9.668027	4.00	9.946937	1.10	9.721089	5.12	0.278911	15
46	.668267	3.98	.946871	1.12	.721396	5.10	.278604	14
47	.668506	4.00	.946804	1.10	.721702	5.12	.278298	13
48	.668746	4.00	.946738	1.12	.722009	5.10	.277991	12
49	.668986	3.98	.946671	1.12	.722315	5.10	.277685	11
50	9.669225	3.98	9.946604	1.10	9.722621	5.10	0.277379	10
51	.669464	3.98	.946538	1.12	.722927	5.08	.277073	9
52	.669703	3.98	.946471	1.12	.723232	5.10	.276768	8
53	.669942	3.98	.946404	1.12	.723538	5.10	.276462	7
54	.670181	3.97	.946337	1.12	.723844	5.08	.276156	6
55	9.670419	3.98	9.946270	1.12	9.724149	5.08	0.275851	5
56	.670658	3.97	.946203	1.12	.724454	5.10	.275546	4
57	.670896	3.97	.946136	1.12	.724760	5.08	.275240	3
58	.671134	3.97	.946069	1.12	.725065	5.08	.274935	2
59	.671372	3.95	.946002	1.12	.725370	5.07	.274630	1
60	9.671609		9.945935		9.725674		0.274326	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

117° 62°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.671609	3.97	9.945935	1.12	9.725674	5.08	0.274326	60
1	.671847	3.95	.945868	1.13	.725979	5.08	.274021	59
2	.672084	3.95	.945800	1.12	.726284	5.07	.273716	58
3	.672321	3.95	.945733	1.12	.726588	5.07	.273412	57
4	.672558	3.95	.945666	1.13	.726892	5.08	.273108	56
5	9.672795	3.95	9.945598	1.12	9.727197	5.07	0.272803	55
6	.673032	3.93	.945531	1.12	.727501	5.07	.272499	54
7	.673268	3.95	.945464	1.13	.727805	5.07	.272195	53
8	.673505	3.93	.945396	1.13	.728109	5.05	.271891	52
9	.673741	3.93	.945328	1.12	.728412	5.07	.271588	51
10	9.673977	3.93	9.945261	1.13	9.728716	5.07	0.271284	50
11	.674213	3.92	.945193	1.13	.729020	5.05	.270980	49
12	.674448	3.93	.945125	1.12	.729323	5.05	.270677	48
13	.674684	3.92	.945058	1.13	.729626	5.05	.270374	47
14	.674919	3.93	.944990	1.13	.729929	5.07	.270071	46
15	9.675155	3.92	9.944922	1.13	9.730233	5.03	0.269767	45
16	.675390	3.90	.944854	1.13	.730535	5.05	.269465	44
17	.675624	3.92	.944786	1.13	.730838	5.05	.269162	43
18	.675859	3.92	.944718	1.13	.731141	5.05	.268859	42
19	.676094	3.90	.944650	1.13	.731444	5.03	.268556	41
20	9.676328	3.90	9.944582	1.13	9.731746	5.03	0.268254	40
21	.676562	3.90	.944514	1.13	.732048	5.05	.267952	39
22	.676796	3.90	.944446	1.15	.732351	5.03	.267649	38
23	.677030	3.90	.944377	1.13	.732653	5.03	.267347	37
24	.677264	3.90	.944309	1.13	.732955	5.03	.267045	36
25	9.677498	3.88	9.944241	1.15	9.733257	5.02	0.266743	35
26	.677731	3.88	.944172	1.13	.733558	5.03	.266442	34
27	.677964	3.88	.944104	1.13	.733860	5.03	.266140	33
28	.678197	3.88	.944036	1.15	.734162	5.02	.265838	32
29	.678430	3.88	.943967	1.13	.734463	5.02	.265537	31
30	9.678663	3.87	9.943899	1.15	9.734764	5.03	0.265236	30
31	.678895	3.88	.943830	1.15	.735066	5.02	.264934	29
32	.679128	3.87	.943761	1.13	.735367	5.02	.264633	28
33	.679360	3.87	.943693	1.15	.735668	5.02	.264332	27
34	.679592	3.87	.943624	1.15	.735969	5.00	.264031	26
35	9.679824	3.87	9.943555	1.15	9.736269	5.02	0.263731	25
36	.680056	3.87	.943486	1.15	.736570	5.00	.263430	24
37	.680288	3.85	.943417	1.15	.736870	5.02	.263130	23
38	.680519	3.85	.943348	1.15	.737171	5.00	.262829	22
39	.680750	3.87	.943279	1.15	.737471	5.00	.262529	21
40	9.680982	3.85	9.943210	1.15	9.737771	5.00	0.262229	20
41	.681213	3.83	.943141	1.15	.738071	5.00	.261929	19
42	.681443	3.85	.943072	1.15	.738371	5.00	.261629	18
43	.681674	3.85	.943003	1.15	.738671	5.00	.261329	17
44	.681905	3.83	.942934	1.17	.738971	5.00	.261029	16
45	9.682135	3.83	9.942864	1.15	9.739271	4.98	0.260729	15
46	.682365	3.83	.942795	1.15	.739570	5.00	.260430	14
47	.682595	3.83	.942726	1.17	.739870	4.98	.260130	13
48	.682825	3.83	.942656	1.15	.740169	4.98	.259831	12
49	.683055	3.82	.942587	1.17	.740468	4.98	.259532	11
50	9.683284	3.83	9.942517	1.15	9.740767	4.98	0.259233	10
51	.683514	3.82	.942448	1.17	.741066	4.98	.258934	9
52	.683743	3.82	.942378	1.17	.741365	4.98	.258635	8
53	.683972	3.82	.942308	1.15	.741664	4.97	.258336	7
54	.684201	3.82	.942239	1.17	.741962	4.98	.258038	6
55	9.684430	3.80	9.942169	1.17	9.742261	4.97	0.257739	5
56	.684658	3.82	.942099	1.17	.742559	4.98	.257441	4
57	.684887	3.80	.942029	1.17	.742858	4.97	.257142	3
58	.685115	3.80	.941959	1.17	.743156	4.97	.256844	2
59	.685343	3.80	.941889	1.17	.743454	4.97	.256546	1
60	9.685571		9.941819		9.743752		0.256248	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.685571	3.80	9.941819	1.17	9.743752	4.97	0.256248	60
1	.685799	3.80	.941749	1.17	.744050	4.97	.255950	59
2	.686027	3.78	.941679	1.17	.744348	4.95	.255652	58
3	.686254	3.80	.941609	1.17	.744645	4.97	.255355	57
4	.686482	3.78	.941539	1.17	.744943	4.95	.255057	56
5	9.686709	3.78	9.941469	1.18	9.745240	4.97	0.254760	55
6	.686936	3.78	.941398	1.17	.745538	4.95	.254462	54
7	.687163	3.77	.941328	1.17	.745835	4.95	.254165	53
8	.687389	3.78	.941258	1.18	.746132	4.95	.253868	52
9	.687616	3.78	.941187	1.17	.746429	4.95	.253571	51
10	9.687843	3.77	9.941117	1.18	9.746726	4.95	0.253274	50
11	.688069	3.77	.941046	1.18	.747023	4.93	.252977	49
12	.688295	3.77	.940975	1.17	.747319	4.95	.252681	48
13	.688521	3.77	.940905	1.18	.747616	4.95	.252384	47
14	.688747	3.75	.940834	1.18	.747913	4.93	.252087	46
15	9.688972	3.77	9.940763	1.17	9.748209	4.93	0.251791	45
16	.689198	3.75	.940693	1.18	.748505	4.93	.251495	44
17	.689423	3.75	.940622	1.18	.748801	4.93	.251199	43
18	.689648	3.75	.940551	1.18	.749097	4.93	.250903	42
19	.689873	3.75	.940480	1.18	.749393	4.93	.250607	41
20	9.690098	3.75	9.940409	1.18	9.749689	4.93	0.250311	40
21	.690323	3.75	.940338	1.18	.749985	4.93	.250015	39
22	.690548	3.73	.940267	1.18	.750281	4.92	.249719	38
23	.690772	3.73	.940196	1.18	.750576	4.93	.249424	37
24	.690996	3.73	.940125	1.18	.750872	4.92	.249128	36
25	9.691220	3.73	9.940054	1.20	9.751167	4.92	0.248833	35
26	.691444	3.73	.939982	1.18	.751462	4.92	.248538	34
27	.691668	3.73	.939911	1.18	.751757	4.92	.248243	33
28	.691892	3.72	.939840	1.20	.752052	4.92	.247948	32
29	.692115	3.73	.939768	1.18	.752347	4.92	.247653	31
30	9.692339	3.72	9.939697	1.20	9.752642	4.92	0.247358	30
31	.692562	3.72	.939625	1.18	.752937	4.90	.247063	29
32	.692785	3.72	.939554	1.20	.753231	4.92	.246769	28
33	.693008	3.72	.939482	1.20	.753526	4.90	.246474	27
34	.693231	3.70	.939410	1.18	.753820	4.92	.246180	26
35	9.693453	3.72	9.939339	1.20	9.754115	4.90	0.245885	25
36	.693676	3.70	.939267	1.20	.754409	4.90	.245591	24
37	.693898	3.70	.939195	1.20	.754703	4.90	.245297	23
38	.694120	3.70	.939123	1.18	.754997	4.90	.245003	22
39	.694342	3.70	.939052	1.20	.755291	4.90	.244709	21
40	9.694564	3.70	9.938980	1.20	9.755585	4.88	0.244415	20
41	.694786	3.68	.938908	1.20	.755878	4.90	.244122	19
42	.695007	3.70	.938836	1.22	.756172	4.88	.243828	18
43	.695229	3.68	.938763	1.20	.756465	4.90	.243535	17
44	.695450	3.68	.938691	1.20	.756759	4.88	.243241	16
45	9.695671	3.68	9.938619	1.20	9.757052	4.88	0.242948	15
46	.695892	3.68	.938547	1.20	.757345	4.88	.242655	14
47	.696113	3.68	.938475	1.22	.757638	4.88	.242362	13
48	.696334	3.67	.938402	1.20	.757931	4.88	.242069	12
49	.696554	3.68	.938330	1.20	.758224	4.88	.241776	11
50	9.696775	3.67	9.938258	1.22	9.758517	4.88	0.241483	10
51	.696995	3.67	.938185	1.20	.758810	4.87	.241190	9
52	.697215	3.67	.938113	1.22	.759102	4.88	.240898	8
53	.697435	3.65	.938040	1.22	.759395	4.87	.240605	7
54	.697654	3.67	.937967	1.20	.759687	4.87	.240313	6
55	9.697874	3.67	9.937895	1.22	9.759979	4.88	0.240021	5
56	.698094	3.65	.937822	1.22	.760272	4.87	.239728	4
57	.698313	3.65	.937749	1.22	.760564	4.87	.239436	3
58	.698532	3.65	.937676	1.20	.760856	4.87	.239144	2
59	.698751	3.65	.937604	1.22	.761148	4.85	.238852	1
60	9.698970		9.937531		9.761439		0.238561	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

119° 60°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.698970	3.65	9.937531	1.22	9.761439	4.87	0.238561	60
1	.699189	3.63	.937458	1.22	.761731	4.87	.238269	59
2	.699407	3.65	.937385	1.22	.762023	4.85	.237977	58
3	.699626	3.63	.937312	1.23	.762314	4.87	.237686	57
4	.699844	3.63	.937238	1.22	.762606	4.85	.237394	56
5	9.700062	3.63	9.937165	1.22	9.762897	4.85	0.237103	55
6	.700280	3.63	.937092	1.22	.763188	4.85	.236812	54
7	.700498	3.63	.937019	1.22	.763479	4.85	.236521	53
8	.700716	3.62	.936946	1.23	.763770	4.85	.236230	52
9	.700933	3.63	.936872	1.22	.764061	4.85	.235939	51
10	9.701151	3.62	9.936799	1.23	9.764352	4.85	0.235648	50
11	.701368	3.62	.936725	1.22	.764643	4.83	.235357	49
12	.701585	3.62	.936652	1.23	.764933	4.85	.235067	48
13	.701802	3.62	.936578	1.22	.765224	4.83	.234776	47
14	.702019	3.62	.936505	1.23	.765514	4.85	.234486	46
15	9.702236	3.60	9.936431	1.23	9.765805	4.83	0.234195	45
16	.702452	3.62	.936357	1.22	.766095	4.83	.233905	44
17	.702669	3.60	.936284	1.23	.766385	4.83	.233615	43
18	.702885	3.60	.936210	1.23	.766675	4.83	.233325	42
19	.703101	3.60	.936136	1.23	.766965	4.83	.233035	41
20	9.703317	3.60	9.936062	1.23	9.767255	4.83	0.232745	40
21	.703533	3.60	.935988	1.23	.767545	4.82	.232455	39
22	.703749	3.58	.935914	1.23	.767834	4.83	.232166	38
23	.703964	3.58	.935840	1.23	.768124	4.83	.231876	37
24	.704179	3.60	.935766	1.23	.768414	4.82	.231586	36
25	9.704395	3.58	9.935692	1.23	9.768703	4.82	0.231297	35
26	.704610	3.58	.935618	1.25	.768992	4.82	.231008	34
27	.704825	3.58	.935543	1.23	.769281	4.83	.230719	33
28	.705040	3.57	.935469	1.23	.769571	4.82	.230429	32
29	.705254	3.58	.935395	1.25	.769860	4.80	.230140	31
30	9.705469	3.57	9.935320	1.23	9.770148	4.82	0.229852	30
31	.705683	3.58	.935246	1.25	.770437	4.82	.229563	29
32	.705898	3.57	.935171	1.23	.770726	4.82	.229274	28
33	.706112	3.57	.935097	1.25	.771015	4.80	.228985	27
34	.706326	3.55	.935022	1.23	.771303	4.82	.228697	26
35	9.706539	3.57	9.934948	1.25	9.771592	4.80	0.228408	25
36	.706753	3.57	.934873	1.25	.771880	4.80	.228120	24
37	.706967	3.55	.934798	1.25	.772168	4.82	.227832	23
38	.707180	3.55	.934723	1.23	.772457	4.80	.227543	22
39	.707393	3.55	.934649	1.25	.772745	4.80	.227255	21
40	9.707606	3.55	9.934574	1.25	9.773033	4.80	0.226967	20
41	.707819	3.55	.934499	1.25	.773321	4.78	.226679	19
42	.708032	3.55	.934424	1.25	.773608	4.80	.226392	18
43	.708245	3.55	.934349	1.25	.773896	4.80	.226104	17
44	.708458	3.53	.934274	1.25	.774184	4.78	.225816	16
45	9.708670	3.53	9.934199	1.27	9.774471	4.80	0.225529	15
46	.708882	3.53	.934123	1.25	.774759	4.78	.225241	14
47	.709094	3.53	.934048	1.25	.775046	4.78	.224954	13
48	.709306	3.53	.933973	1.25	.775333	4.80	.224667	12
49	.709518	3.53	.933898	1.27	.775621	4.78	.224379	11
50	9.709730	3.52	9.933822	1.25	9.775908	4.78	0.224092	10
51	.709941	3.53	.933747	1.27	.776195	4.78	.223805	9
52	.710153	3.52	.933671	1.25	.776482	4.77	.223518	8
53	.710364	3.52	.933596	1.27	.776768	4.78	.223232	7
54	.710575	3.52	.933520	1.25	.777055	4.78	.222945	6
55	9.710786	3.52	9.933445	1.27	9.777342	4.77	0.222658	5
56	.710997	3.52	.933369	1.27	.777628	4.78	.222372	4
57	.711208	3.52	.933293	1.27	.777915	4.77	.222085	3
58	.711419	3.50	.933217	1.27	.778201	4.78	.221799	2
59	.711629	3.50	.933141	1.25	.778488	4.77	.221512	1
60	9.711839		9.933066		9.778774		0.221226	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
9.711839	3.52	9.933066	1.27	9.778774	4.77	0.221226	60
.712050	3.50	.932990	1.27	.779060	4.77	.220940	59
.712260	3.48	.932914	1.27	.779346	4.77	.220654	58
.712469	3.50	.932838	1.27	.779632	4.77	.220368	57
.712679	3.50	.932762	1.28	.779918	4.75	.220082	56
9.712889	3.48	9.932685	1.27	9.780203	4.77	0.219797	55
.713098	3.50	.932609	1.27	.780489	4.77	.219511	54
.713308	3.48	.932533	1.27	.780775	4.75	.219225	53
.713517	3.48	.932457	1.28	.781060	4.77	.218940	52
.713726	3.48	.932380	1.27	.781346	4.75	.218654	51
9.713935	3.48	9.932304	1.27	9.781631	4.75	0.218369	50
.714144	3.47	.932228	1.28	.781916	4.75	.218084	49
.714352	3.48	.932151	1.27	.782201	4.75	.217799	48
.714561	3.47	.932075	1.28	.782486	4.75	.217514	47
.714769	3.48	.931998	1.28	.782771	4.75	.217229	46
9.714978	3.47	9.931921	1.27	9.783056	4.75	0.216944	45
.715186	3.47	.931845	1.28	.783341	4.75	.216659	44
.715394	3.47	.931768	1.28	.783626	4.73	.216374	43
.715602	3.45	.931691	1.28	.783910	4.75	.216090	42
.715809	3.47	.931614	1.28	.784195	4.73	.215805	41
9.716017	3.45	9.931537	1.28	9.784479	4.75	0.215521	40
.716224	3.47	.931460	1.28	.784764	4.73	.215236	39
.716432	3.45	.931383	1.28	.785048	4.73	.214952	38
.716639	3.45	.931306	1.28	.785332	4.73	.214668	37
.716846	3.45	.931229	1.28	.785616	4.73	.214384	36
9.717053	3.43	9.931152	1.28	9.785900	4.73	0.214100	35
.717259	3.45	.931075	1.28	.786184	4.73	.213816	34
.717466	3.45	.930998	1.28	.786468	4.73	.213532	33
.717673	3.43	.930921	1.30	.786752	4.73	.213248	32
.717879	3.43	.930843	1.28	.787036	4.72	.212964	31
9.718085	3.43	9.930766	1.30	9.787319	4.73	0.212681	30
.718291	3.43	.930688	1.28	.787603	4.72	.212397	29
.718497	3.43	.930611	1.30	.787886	4.73	.212114	28
.718703	3.43	.930533	1.28	.788170	4.72	.211830	27
.718909	3.42	.930456	1.30	.788453	4.72	.211547	26
9.719114	3.43	9.930378	1.30	9.788736	4.72	0.211264	25
.719320	3.42	.930300	1.28	.789019	4.72	.210981	24
.719525	3.42	.930223	1.30	.789302	4.72	.210698	23
.719730	3.42	.930145	1.30	.789585	4.72	.210415	22
.719935	3.42	.930067	1.30	.789868	4.72	.210132	21
9.720140	3.42	9.929989	1.30	9.790151	4.72	0.209849	20
.720345	3.40	.929911	1.30	.790434	4.70	.209566	19
.720549	3.42	.929833	1.30	.790716	4.72	.209284	18
.720754	3.40	.929755	1.30	.790999	4.70	.209001	17
.720958	3.40	.929677	1.30	.791281	4.70	.208719	16
9.721162	3.40	9.929599	1.30	9.791563	4.72	0.208437	15
.721366	3.40	.929521	1.32	.791846	4.70	.208154	14
.721570	3.40	.929442	1.30	.792128	4.70	.207872	13
.721774	3.40	.929364	1.30	.792410	4.70	.207590	12
.721978	3.38	.929286	1.32	.792692	4.70	.207308	11
9.722181	3.40	9.929207	1.30	9.792974	4.70	0.207026	10
.722385	3.38	.929129	1.32	.793256	4.70	.206744	9
.722588	3.38	.929050	1.30	.793538	4.68	.206462	8
.722791	3.38	.928972	1.32	.793819	4.70	.206181	7
.722994	3.38	.928893	1.30	.794101	4.70	.205899	6
9.723197	3.38	9.928815	1.32	9.794383	4.68	0.205617	5
.723400	3.38	.928736	1.32	.794664	4.70	.205336	4
.723603	3.37	.928657	1.32	.794946	4.68	.205054	3
.723805	3.37	.928578	1.32	.795227	4.68	.204773	2
.724007	3.38	.928499	1.32	.795508	4.68	.204492	1
9.724210		9.928420		9.795789		0.204211	0
Cos.	**D. 1″.**	**Sin.**	**D. 1″.**	**Cot.**	**D. 1″.**	**Tan.**	**M.**

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.724210	3.37	9.928420	1 30	9.795789	4.68	0.204211	60
1	.724412	3.37	.928342	1.32	.796070	4.68	.203930	59
2	.724614	3.37	.928263	1.33	.796351	4.68	.203649	58
3	.724816	3.35	.928183	1.32	.796632	4.68	.203368	57
4	.725017	3.37	.928104	1.32	.796913	4.68	.203087	56
5	9.725219	3.35	9.928025	1.32	9.797194	4.67	0.202806	55
6	.725420	3.37	.927946	1.32	.797474	4.68	.202526	54
7	.725622	3.35	.927867	1.33	.797755	4.68	.202245	53
8	.725823	3.35	.927787	1.32	.798036	4.67	.201964	52
9	.726024	3.35	.927708	1.32	.798316	4.67	.201684	51
10	9.726225	3.35	9.927629	1.33	9.798596	4.68	0.201404	50
11	.726426	3.33	.927549	1.32	.798877	4.67	.201123	49
12	.726626	3.35	.927470	1.33	.799157	4.67	.200843	48
13	.726827	3.33	.927390	1.33	.799437	4.67	.200563	47
14	.727027	3.35	.927310	1.32	.799717	4.67	.200283	46
15	9.727228	3.33	9.927231	1.33	9.799997	4.67	0.200003	45
16	.727428	3.33	.927151	1.33	.800277	4.67	.199723	44
17	.727628	3.33	.927071	1.33	.800557	4.65	.199443	43
18	.727828	3.32	.926991	1.33	.800836	4.67	.199164	42
19	.728027	3.33	.926911	1.33	.801116	4.67	.198884	41
20	9.728227	3.33	9.926831	1.33	9.801396	4.65	0.198604	40
21	.728427	3.32	.926751	1.33	.801675	4.67	.198325	39
22	.728626	3.32	.926671	1.33	.801955	4.65	.198045	38
23	.728825	3.32	.926591	1.33	.802234	4.65	.197766	37
24	.729024	3.32	.926511	1.33	.802513	4.65	.197487	36
25	9.729223	3.32	9.926431	1.33	9.802792	4.67	0.197208	35
26	.729422	3.32	.926351	1.35	.803072	4.65	.196928	34
27	.729621	3.32	.926270	1.33	.803351	4.65	.196649	33
28	.729820	3.30	.926190	1.33	.803630	4.65	.196370	32
29	.730018	3.32	.926110	1.35	.803909	4.63	.196091	31
30	9.730217	3.30	9.926029	1.33	9.804187	4.65	0.195813	30
31	.730415	3.30	.925949	1.35	.804466	4.65	.195534	29
32	.730613	3.30	.925868	1.33	.804745	4.63	.195255	28
33	.730811	3.30	.925788	1.35	.805023	4.65	.194977	27
34	.731009	3.28	.925707	1.35	.805302	4.63	.194698	26
35	9.731206	3.30	9.925626	1.35	9.805580	4.65	0.194420	25
36	.731404	3.30	.925545	1.33	.805859	4.63	.194141	24
37	.731602	3.28	.925465	1.35	.806137	4.63	.193863	23
38	.731799	3.28	.925384	1.35	.806415	4.63	.193585	22
39	.731996	3.28	.925303	1.35	.806693	4.63	.193307	21
40	9.732193	3.28	9.925222	1.35	9.806971	4.63	0.193029	20
41	.732390	3.28	.925141	1.35	.807249	4.63	.192751	19
42	.732587	3.28	.925060	1.35	.807527	4.63	.192473	18
43	.732784	3.27	.924979	1.37	.807805	4.63	.192195	17
44	.732980	3.28	.924897	1.35	.808083	4.63	.191917	16
45	9.733177	3.27	9.924816	1.35	9.808361	4.62	0.191639	15
46	.733373	3.27	.924735	1.35	.808638	4.63	.191362	14
47	.733569	3.27	.924654	1.37	.808916	4.62	.191084	13
48	.733765	3.27	.924572	1.35	.809193	4.63	.190807	12
49	.733961	3.27	.924491	1.37	.809471	4.62	.190529	11
50	9.734157	3.27	9.924409	1.35	9.809748	4.62	0.190252	10
51	.734353	3.27	.924328	1.37	.810025	4.62	.189975	9
52	.734549	3.25	.924246	1.37	.810302	4.63	.189698	8
53	.734744	3.25	.924164	1.35	.810580	4.62	.189420	7
54	.734939	3.27	.924083	1.37	.810857	4.62	.189143	6
55	9.735135	3.25	9.924001	1.37	9.811134	4.60	0.188866	5
56	.735330	3.25	.923919	1.37	.811410	4.62	.188590	4
57	.735525	3.23	.923837	1.37	.811687	4.62	.188313	3
58	.735719	3.25	.923755	1.37	.811964	4.62	.188036	2
59	.735914	3.25	.923673	1.37	.812241	4.60	.187759	1
60	9.736109		9.923591		9.812517		0.187483	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.736109	3.23	9.923591	1.37	9.812517	4.62	0.187483	60
1	.736303	3.25	.923509	1.37	.812794	4.60	.187206	59
2	.736498	3.23	.923427	1.37	.813070	4.62	.186930	58
3	.736692	3.23	.923345	1.37	.813347	4.60	.186653	57
4	.736886	3.23	.923263	1.37	.813623	4.60	.186377	56
5	9.737080	3.23	9.923181	1.38	9.813899	4.62	0.186101	55
6	.737274	3.22	.923098	1.37	.814176	4.60	.185824	54
7	.737467	3.23	.923016	1.38	.814452	4.60	.185548	53
8	.737661	3.23	.922933	1.37	.814728	4.60	.185272	52
9	.737855	3.22	.922851	1.38	.815004	4.60	.184996	51
10	9.738048	3.22	9.922768	1.37	9.815280	4.58	0.184720	50
11	.738241	3.22	.922686	1.38	.815555	4.60	.184445	49
12	.738434	3.22	.922603	1.38	.815831	4.60	.184169	48
13	.738627	3.22	.922520	1.37	.816107	4.58	.183893	47
14	.738820	3.22	.922438	1.38	.816382	4.60	.183618	46
15	9.739013	3.22	9.922355	1.38	9.816658	4.58	0.183342	45
16	.739206	3.20	.922272	1.38	.816933	4.60	.183067	44
17	.739398	3.20	.922189	1.38	.817209	4.58	.182791	43
18	.739590	3.22	.922106	1.38	.817484	4.58	.182516	42
19	.739783	3.20	.922023	1.38	.817759	4.60	.182241	41
20	9.739975	3.20	9.921940	1.38	9.818035	4.58	0.181965	40
21	.740167	3.20	.921857	1.38	.818310	4.58	.181690	39
22	.740359	3.18	.921774	1.38	.818585	4.58	.181415	38
23	.740550	3.20	.921691	1.40	.818860	4.58	.181140	37
24	.740742	3.20	.921607	1.38	.819135	4.58	.180865	36
25	9.740934	3.18	9.921524	1.38	9.819410	4.57	0.180590	35
26	.741125	3.18	.921441	1.40	.819684	4.58	.180316	34
27	.741316	3.20	.921357	1.38	.819959	4.58	.180041	33
28	.741508	3.18	.921274	1.40	.820234	4.57	.179766	32
29	.741699	3.17	.921190	1.38	.820508	4.58	.179492	31
30	9.741889	3.18	9.921107	1.40	9.820783	4.57	0.179217	30
31	.742080	3.18	.921023	1.40	.821057	4.58	.178943	29
32	.742271	3.18	.920939	1.38	.821332	4.57	.178668	28
33	.742462	3.17	.920856	1.40	.821606	4.57	.178394	27
34	.742652	3.17	.920772	1.40	.821880	4.57	.178120	26
35	9.742842	3.18	9.920688	1.40	9.822154	4.58	0.177846	25
36	.743033	3.17	.920604	1.40	.822429	4.57	.177571	24
37	.743223	3.17	.920520	1.40	.822703	4.57	.177297	23
38	.743413	3.15	.920436	1.40	.822977	4.57	.177023	22
39	.743602	3.17	.920352	1.40	.823251	4.55	.176749	21
40	9.743792	3.17	9.920268	1.40	9.823524	4.57	0.176476	20
41	.743982	3.15	.920184	1.42	.823798	4.57	.176202	19
42	.744171	3.17	.920099	1.40	.824072	4.55	.175928	18
43	.744361	3.15	.920015	1.40	.824345	4.57	.175655	17
44	.744550	3.15	.919931	1.42	.824619	4.57	.175381	16
45	9.744739	3.15	9.919846	1.40	9.824893	4.55	0.175107	15
46	.744928	3.15	.919762	1.42	.825166	4.55	.174834	14
47	.745117	3.15	.919677	1.40	.825439	4.57	.174561	13
48	.745306	3.13	.919593	1.42	.825713	4.55	.174287	12
49	.745494	3.15	.919508	1.40	.825986	4.55	.174014	11
50	9.745683	3.13	9.919424	1.42	9.826259	4.55	0.173741	10
51	.745871	3.15	.919339	1.42	.826532	4.55	.173468	9
52	.746060	3.13	.919254	1.42	.826805	4.55	.173195	8
53	.746248	3.13	.919169	1.40	.827078	4.55	.172922	7
54	.746436	3.13	.919085	1.42	.827351	4.55	.172649	6
55	9.746624	3.13	9.919000	1.42	9.827624	4.55	0.172376	5
56	.746812	3.12	.918915	1.42	.827897	4.55	.172103	4
57	.746999	3.13	.918830	1.42	.828170	4.53	.171830	3
58	.747187	3.12	.918745	1.43	.828442	4.55	.171558	2
59	.747374	3.13	.918659	1.42	.828715	4.53	.171285	1
60	9.747562		9.918574		9.828987		0.171013	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

123° 56°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.747562	3.12	9.918574	1.42	9.828987	4.55	0.171013	60
1	.747749	3.12	.918489	1.42	.829260	4.53	.170740	59
2	.747936	3.12	.918404	1.43	.829532	4.55	.170468	58
3	.748123	3.12	.918318	1.42	.829805	4.53	.170195	57
4	.748310	3.12	.918233	1.43	.830077	4.53	.169923	56
5	9.748497	3.10	9.918147	1.42	9.830349	4.53	0.169651	55
6	.748683	3.12	.918062	1.43	.830621	4.53	.169379	54
7	.748870	3.10	.917976	1.42	.830893	4.53	.169107	53
8	.749056	3.12	.917891	1.43	.831165	4.53	.168835	52
9	.749243	3.10	.917805	1.43	.831437	4.53	.168563	51
10	9.749429	3.10	9.917719	1.42	9.831709	4.53	0.168291	50
11	.749615	3.10	.917634	1.43	.831981	4.53	.168019	49
12	.749801	3.10	.917548	1.43	.832253	4.53	.167747	48
13	.749987	3.08	.917462	1.43	.832525	4.52	.167475	47
14	.750172	3.10	.917376	1.43	.832796	4.53	.167204	46
15	9.750358	3.08	9.917290	1.43	9.833068	4.52	0.166932	45
16	.750543	3.10	.917204	1.43	.833339	4.53	.166661	44
17	.750729	3.08	.917118	1.43	.833611	4.52	.166389	43
18	.750914	3.08	.917032	1.43	.833882	4.53	.166118	42
19	.751099	3.08	.916946	1.45	.834154	4.52	.165846	41
20	9.751284	3.08	9.916859	1.43	9.834425	4.52	0.165575	40
21	.751469	3.08	.916773	1.43	.834696	4.52	.165304	39
22	.751654	3.08	.916687	1.45	.834967	4.52	.165033	38
23	.751839	3.07	.916600	1.43	.835238	4.52	.164762	37
24	.752023	3.08	.916514	1.45	.835509	4.52	.164491	36
25	9.752208	3.07	9.916427	1.43	9.835780	4.52	0.164220	35
26	.752392	3.07	.916341	1.45	.836051	4.52	.163949	34
27	.752576	3.07	.916254	1.45	.836322	4.52	.163678	33
28	.752760	3.07	.916167	1.43	.836593	4.52	.163407	32
29	.752944	3.07	.916081	1.45	.836864	4.50	.163136	31
30	9.753128	3.07	9.915994	1.45	9.837134	4.52	0.162866	30
31	.753312	3.05	.915907	1.45	.837405	4.50	.162595	29
32	.753495	3.07	.915820	1.45	.837675	4.52	.162325	28
33	.753679	3.05	.915733	1.45	.837946	4.50	.162054	27
34	.753862	3.07	.915646	1.45	.838216	4.52	.161784	26
35	9.754046	3.05	9.915559	1.45	9.838487	4.50	0.161513	25
36	.754229	3.05	.915472	1.45	.838757	4.50	.161243	24
37	.754412	3.05	.915385	1.47	.839027	4.50	.160973	23
38	.754595	3.05	.915297	1.45	.839297	4.52	.160703	22
39	.754778	3.03	.915210	1.45	.839568	4.50	.160432	21
40	9.754960	3.05	9.915123	1.47	9.839838	4.50	0.160162	20
41	.755143	3.05	.915035	1.45	.840108	4.50	.159892	19
42	.755326	3.03	.914948	1.47	.840378	4.50	.159622	18
43	.755508	3.03	.914860	1.45	.840648	4.48	.159352	17
44	.755690	3.03	.914773	1.47	.840917	4.50	.159083	16
45	9.755872	3.03	9.914685	1.45	9.841187	4.50	0.158813	15
46	.756054	3.03	.914598	1.47	.841457	4.50	.158543	14
47	.756236	3.03	.914510	1.47	.841727	4.48	.158273	13
48	.756418	3.03	.914422	1.47	.841996	4.50	.158004	12
49	.756600	3.03	.914334	1.47	.842266	4.48	.157734	11
50	9.756782	3.02	9.914246	1.47	9.842535	4.50	0.157465	10
51	.756963	3.02	.914158	1.47	.842805	4.48	.157195	9
52	.757144	3.03	.914070	1.47	.843074	4.48	.156926	8
53	.757326	3.02	.913982	1.47	.843343	4.48	.156657	7
54	.757507	3.02	.913894	1.47	.843612	4.50	.156388	6
55	9.757688	3.02	9.913806	1.47	9.843882	4.48	0.156118	5
56	.757869	3.02	.913718	1.47	.844151	4.48	.155849	4
57	.758050	3.00	.913630	1.48	.844420	4.48	.155580	3
58	.758230	3.02	.913541	1.47	.844689	4.48	.155311	2
59	.758411	3.00	.913453	1.47	.844958	4.48	.155042	1
60	9.758591		9.913365		9.845227		0.154773	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

35° 144°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.758591	3.02	9.913365	1.48	9.845227	4.48	0.154773	60
1	.758772	3.00	.913276	1.48	.845496	4.47	.154504	59
2	.758952	3.00	.913187	1.47	.845764	4.48	.154236	58
3	.759132	3.00	.913099	1.48	.846033	4.48	.153967	57
4	.759312	3.00	.913010	1.47	.846302	4.47	.153698	56
5	9.759492	3.00	9.912922	1.48	9.846570	4.48	0.153430	55
6	.759672	3.00	.912833	1.48	.846839	4.48	.153161	54
7	.759852	2.98	.912744	1.48	.847108	4.47	.152892	53
8	.760031	3.00	.912655	1.48	.847376	4.47	.152624	52
9	.760211	2.98	.912566	1.48	.847644	4.48	.152356	51
10	9.760390	2.98	9.912477	1.48	9.847913	4.47	0.152087	50
11	.760569	2.98	.912388	1.48	.848181	4.47	.151819	49
12	.760748	2.98	.912299	1.48	.848449	4.47	.151551	48
13	.760927	2.98	.912210	1.48	.848717	4.48	.151283	47
14	.761106	2.98	.912121	1.50	.848986	4.47	.151014	46
15	9.761285	2.98	9.912031	1.48	9.849254	4.47	0.150746	45
16	.761464	2.97	.911942	1.48	.849522	4.47	.150478	44
17	.761642	2.98	.911853	1.50	.849790	4.45	.150210	43
18	.761821	2.97	.911763	1.48	.850057	4.47	.149943	42
19	.761999	2.97	.911674	1.50	.850325	4.47	.149675	41
20	9.762177	2.98	9.911584	1.48	9.850593	4.47	0.149407	40
21	.762356	2.97	.911495	1.50	.850861	4.47	.149139	39
22	.762534	2.97	.911405	1.50	.851129	4.45	.148871	38
23	.762712	2.95	.911315	1.48	.851396	4.47	.148604	37
24	.762889	2.97	.911226	1.50	.851664	4.45	.148336	36
25	9.763067	2.97	9.911136	1.50	9.851931	4.47	0.148069	35
26	.763245	2.95	.911046	1.50	.852199	4.45	.147801	34
27	.763422	2.97	.910956	1.50	.852466	4.45	.147534	33
28	.763600	2.95	.910866	1.50	.852733	4.47	.147267	32
29	.763777	2.95	.910776	1.50	.853001	4.45	.146999	31
30	9.763954	2.95	9.910686	1.50	9.853268	4.45	0.146732	30
31	.764131	2.95	.910596	1.50	.853535	4.45	.146465	29
32	.764308	2.95	.910506	1.52	.853802	4.45	.146198	28
33	.764485	2.95	.910415	1.50	.854069	4.45	.145931	27
34	.764662	2.93	.910325	1.50	.854336	4.45	.145664	26
35	9.764838	2.95	9.910235	1.52	9.854603	4.45	0.145397	25
36	.765015	2.93	.910144	1.50	.854870	4.45	.145130	24
37	.765191	2.93	.910054	1.52	.855137	4.45	.144863	23
38	.765367	2.95	.909963	1.50	.855404	4.45	.144596	22
39	.765544	2.93	.909873	1.52	.855671	4.45	.144329	21
40	9.765720	2.93	9.909782	1.52	9.855938	4.43	0.144062	20
41	.765896	2.93	.909691	1.50	.856204	4.45	.143796	19
42	.766072	2.92	.909601	1.52	.856471	4.43	.143529	18
43	.766247	2.93	.909510	1.52	.856737	4.45	.143263	17
44	.766423	2.92	.909419	1.52	.857004	4.43	.142996	16
45	9.766598	2.93	9.909328	1.52	9.857270	4.45	0.142730	15
46	.766774	2.92	.909237	1.52	.857537	4.43	.142463	14
47	.766949	2.92	.909146	1.52	.857803	4.43	.142197	13
48	.767124	2.93	.909055	1.52	.858069	4.45	.141931	12
49	.767300	2.92	.908964	1.52	.858336	4.43	.141664	11
50	9.767475	2.90	9.908873	1.53	9.858602	4.43	0.141398	10
51	.767649	2.92	.908781	1.52	.858868	4.43	.141132	9
52	.767824	2.92	.908690	1:52	.859134	4.43	.140866	8
53	.767999	2.90	.908599	1.53	.859400	4.43	.140600	7
54	.768173	2.92	.908507	1.52	.859666	4.43	.140334	6
55	9.768348	2.90	9.908416	1.53	9.859932	4.43	0.140068	5
56	.768522	2.92	.908324	1.52	.860198	4.43	.139802	4
57	.768697	2.90	.908233	1.53	.860464	4.43	.139536	3
58	.768871	2.90	.908141	1.53	.860730	4.42	.139270	2
59	.769045	2.90	.908049	1.52	.860995	4.43	.139005	1
60	9.769219		9.907958		9.861261		0.138739	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

125° 54°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.
0	9.769219	2.90	9.907958	1.53	9.861261	4.43	0.138739
1	.769393	2.88	.907866	1.53	.861527	4.42	.138473
2	.769566	2.90	.907774	1.53	.861792	4.43	.138208
3	.769740	2.88	.907682	1.53	.862058	4.42	.137942
4	.769913	2.90	.907590	1.53	.862323	4.43	.137677
5	9.770087	2.88	9.907498	1.53	9.862589	4.42	0.137411
6	.770260	2.88	.907406	1.53	.862854	4.42	.137146
7	.770433	2.88	.907314	1.53	.863119	4.43	.136881
8	.770606	2.88	.907222	1.55	.863385	4.42	.136615
9	.770779	2.88	.907129	1.53	.863650	4.42	.136350
10	9.770952	2.88	9.907037	1.53	9.863915	4.42	0.136085
11	.771125	2.88	.906945	1.55	.864180	4.42	.135820
12	.771298	2.87	.906852	1.53	.864445	4.42	.135555
13	.771470	2.88	.906760	1.55	.864710	4.42	.135290
14	.771643	2.87	.906667	1.53	.864975	4.42	.135025
15	9.771815	2.87	9.906575	1.55	9.865240	4.42	0.134760
16	.771987	2.87	.906482	1.55	.865505	4.42	.134495
17	.772159	2.87	.906389	1.55	.865770	4.42	.134230
18	.772331	2.87	.906296	1.53	.866035	4.42	.133965
19	.772503	2.87	.906204	1.55	.866300	4.40	.133700
20	9.772675	2.87	9.906111	1.55	9.866564	4.42	0.133436
21	.772847	2.85	.906018	1.55	.866829	4.42	.133171
22	.773018	2.87	.905925	1.55	.867094	4.40	.132906
23	.773190	2.85	.905832	1.55	.867358	4.42	.132642
24	.773361	2.87	.905739	1.57	.867623	4.40	.132377
25	9.773533	2.85	9.905645	1.55	9.867887	4.42	0.132113
26	.773704	2.85	.905552	1.55	.868152	4.40	.131848
27	.773875	2.85	.905459	1.55	.868416	4.40	.131584
28	.774046	2.85	.905366	1.57	.868680	4.42	.131320
29	.774217	2.85	.905272	1.55	.868945	4.40	.131055
30	9.774388	2.83	9.905179	1.57	9.869209	4.40	0.130791
31	.774558	2.85	.905085	1.55	.869473	4.40	.130527
32	.774729	2.83	.904992	1.57	.869737	4.40	.130263
33	.774899	2.85	.904898	1.57	.870001	4.40	.129999
34	.775070	2.83	.904804	1.55	.870265	4.40	.129735
35	9.775240	2.83	9.904711	1.57	9.870529	4.40	0.129471
36	.775410	2.83	.904617	1.57	.870793	4.40	.129207
37	.775580	2.83	.904523	1.57	.871057	4.40	.128943
38	.775750	2.83	.904429	1.57	.871321	4.40	.128679
39	.775920	2.83	.904335	1.57	.871585	4.40	.128415
40	9.776090	2.82	9.904241	1.57	9.871849	4.38	0.128151
41	.776259	2.83	.904147	1.57	.872112	4.40	.127888
42	.776429	2.82	.904053	1.57	.872376	4.40	.127624
43	.776598	2.83	.903959	1.58	.872640	4.38	.127360
44	.776768	2.82	.903864	1.57	.872903	4.40	.127097
45	9.776937	2.82	9.903770	1.57	9.873167	4.38	0.126833
46	.777106	2.82	.903676	1.58	.873430	4.40	.126570
47	.777275	2.82	.903581	1.57	.873694	4.38	.126306
48	.777444	2.82	.903487	1.58	.873957	4.38	.126043
49	.777613	2.80	.903392	1.57	.874220	4.40	.125780
50	9.777781	2.82	9.903298	1.58	9.874484	4.38	0.125516
51	.777950	2.82	.903203	1.58	.874747	4.38	.125253
52	.778119	2.80	.903108	1.57	.875010	4.38	.124990
53	.778287	2.80	.903014	1.58	.875273	4.40	.124727
54	.778455	2.82	.902919	1.58	.875537	4.38	.124463
55	9.778624	2.80	9.902824	1.58	9.875800	4.38	0.124200
56	.778792	2.80	.902729	1.58	.876063	4.38	.123937
57	.778960	2.80	.902634	1.58	.876326	4.38	.123674
58	.779128	2.78	.902539	1.58	.876589	4.38	.123411
59	.779295	2.80	.902444	1.58	.876852	4.37	.123148
60	9.779463		9.902349		9.877114		0.122886
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.

126°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.779463	2.80	9.902349	1.60	9.877114	4.38	0.122886	60
1	.779631	2.78	.902253	1.58	.877377	4.38	.122623	59
2	.779798	2.80	.902158	1.58	.877640	4.38	.122360	58
3	.779966	2.78	.902063	1.60	.877903	4.37	.122097	57
4	.780133	2.78	.901967	1.58	.878165	4.38	.121835	56
5	9.780300	2.78	9.901872	1.60	9.878428	4.38	0.121572	55
6	.780467	2.78	.901776	1.58	.878691	4.37	.121309	54
7	.780634	2.78	.901681	1.60	.878953	4.38	.121047	53
8	.780801	2.78	.901585	1.58	.879216	4.37	.120784	52
9	.780968	2.77	.901490	1.60	.879478	4.38	.120522	51
10	9.781134	2.78	9.901394	1.60	9.879741	4.37	0.120259	50
11	.781301	2.78	.901298	1.60	.880003	4.37	.119997	49
12	.781468	2.77	.901202	1.60	.880265	4.38	.119735	48
13	.781634	2.77	.901106	1.60	.880528	4.37	.119472	47
14	.781800	2.77	.901010	1.60	.880790	4.37	.119210	46
15	9.781966	2.77	9.900914	1.60	9.881052	4.37	0.118948	45
16	.782132	2.77	.900818	1.60	.881314	4.38	.118686	44
17	.782298	2.77	.900722	1.60	.881577	4.37	.118423	43
18	.782464	2.77	.900626	1.62	.881839	4.37	.118161	42
19	.782630	2.77	.900529	1.60	.882101	4.37	.117899	41
20	9.782796	2.75	9.900433	1.60	9.882363	4.37	0.117637	40
21	.782961	2.77	.900337	1.62	.882625	4.37	.117375	39
22	.783127	2.75	.900240	1.60	.882887	4.35	.117113	38
23	.783292	2.77	.900144	1.62	.883148	4.37	.116852	37
24	.783458	2.75	.900047	1.60	.883410	4.37	.116590	36
25	9.783623	2.75	9.899951	1.62	9.883672	4.37	0.116328	35
26	.783788	2.75	.899854	1.62	.883934	4.37	.116066	34
27	.783953	2.75	.899757	1.62	.884196	4.35	.115804	33
28	.784118	2.73	.899660	1.60	.884457	4.37	.115543	32
29	.784282	2.75	.899564	1.62	.884719	4.35	.115281	31
30	9.784447	2.75	9.899467	1.62	9.884980	4.37	0.115020	30
31	.784612	2.73	.899370	1.62	.885242	4.37	.114758	29
32	.784776	2.75	.899273	1.62	.885504	4.35	.114496	28
33	.784941	2.73	.899176	1.63	.885765	4.35	.114235	27
34	.785105	2.73	.899078	1.62	.886026	4.37	.113974	26
35	9.785269	2.73	9.898981	1.62	9.886288	4.35	0.113712	25
36	.785433	2.73	.898884	1.62	.886549	4.37	.113451	24
37	.785597	2.73	.898787	1.63	.886811	4.35	.113189	23
38	.785761	2.73	.898689	1.62	.887072	4.35	.112928	22
39	.785925	2.73	.898592	1.63	.887333	4.35	.112667	21
40	9.786089	2.72	9.898494	1.62	9.887594	4.35	0.112406	20
41	.786252	2.73	.898397	1.63	.887855	4.35	.112145	19
42	.786416	2.72	.898299	1.62	.888116	4.37	.111884	18
43	.786579	2.72	.898202	1.63	.888378	4.35	.111622	17
44	.786742	2.73	.898104	1.63	.888639	4.35	.111361	16
45	9.786906	2.72	9.898006	1.63	9.888900	4.35	0.111100	15
46	.787069	2.72	.897908	1.63	.889161	4.33	.110839	14
47	.787232	2.72	.897810	1.63	.889421	4.35	.110579	13
48	.787395	2.70	.897712	1.63	.889682	4.35	.110318	12
49	.787557	2.72	.897614	1.63	.889943	4.35	.110057	11
50	9.787720	2.72	9.897516	1.63	9.890204	4.35	0.109796	10
51	.787883	2.70	.897418	1.63	.890465	4.33	.109535	9
52	.788045	2.72	.897320	1.63	.890725	4.35	.109275	8
53	.788208	2.70	.897222	1.65	.890986	4.35	.109014	7
54	.788370	2.70	.897123	1.63	.891247	4.33	.108753	6
55	9.788532	2.70	9.897025	1.65	9.891507	4.35	0.108493	5
56	.788694	2.70	.896926	1.63	.891768	4.33	.108232	4
57	.788856	2.70	.896828	1.65	.892028	4.35	.107972	3
58	.789018	2.70	.896729	1.63	.892289	4.33	.107711	2
59	.789180	2.70	.896631	1.65	.892549	4.35	.107451	1
60	9.789342		9.896532		9.892810		0.107190	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.789342	2.70	9.896532	1.65	9.892810	4.33	0.107190	60
1	.789504	2.68	.896433	1.63	.893070	4.35	.106930	59
2	.789665	2.70	.896335	1.65	.893331	4.33	.106669	58
3	.789827	2.68	.896236	1.65	.893591	4.33	.106409	57
4	.789988	2.68	.896137	1.65	.893851	4.33	.106149	56
5	9.790149	2.68	9.896038	1.65	9.894111	4.35	0.105889	55
6	.790310	2.68	.895939	1.65	.894372	4.33	.105628	54
7	.790471	2.68	.895840	1.65	.894632	4.33	.105368	53
8	.790632	2.68	.895741	1.67	.894892	4.33	.105108	52
9	.790793	2.68	.895641	1.65	.895152	4.33	.104848	51
10	9.790954	2.68	9.895542	1.65	9.895412	4.33	0.104588	50
11	.791115	2.67	.895443	1.67	.895672	4.33	.104328	49
12	.791275	2.68	.895343	1.65	.895932	4.33	.104068	48
13	.791436	2.67	.895244	1.65	.896192	4.33	.103808	47
14	.791596	2.68	.895145	1.67	.896452	4.33	.103548	46
15	9.791757	2.67	9.895045	1.67	9.896712	4.32	0.103288	45
16	.791917	2.67	.894945	1.65	.896971	4.33	.103029	44
17	.792077	2.67	.894846	1.67	.897231	4.33	.102769	43
18	.792237	2.67	.894746	1.67	.897491	4.33	.102509	42
19	.792397	2.67	.894646	1.67	.897751	4.32	.102249	41
20	9.792557	2.65	9.894546	1.67	9.898010	4.33	0.101990	40
21	.792716	2.67	.894446	1.67	.898270	4.33	.101730	39
22	.792876	2.65	.894346	1.67	.898530	4.32	.101470	38
23	.793035	2.67	.894246	1.67	.898789	4.33	.101211	37
24	.793195	2.65	.894146	1.67	.899049	4.32	.100951	36
25	9.793354	2.67	9.894046	1.67	9.899308	4.33	0.100692	35
26	.793514	2.65	.893946	1.67	.899568	4.32	.100432	34
27	.793673	2.65	.893846	1.68	.899827	4.33	.100173	33
28	.793832	2.65	.893745	1.67	.900087	4.32	.099913	32
29	.793991	2.65	.893645	1.68	.900346	4.32	.099654	31
30	9.794150	2.63	9.893544	1.67	9.900605	4.32	0.099395	30
31	.794308	2.65	.893444	1.68	.900864	4.33	.099136	29
32	.794467	2.65	.893343	1.67	.901124	4.32	.098876	28
33	.794626	2.63	.893243	1.68	.901383	4.32	.098617	27
34	.794784	2.63	.893142	1.68	.901642	4.32	.098358	26
35	9.794942	2.65	9.893041	1.68	9.901901	4.32	0.098099	25
36	.795101	2.63	.892940	1.68	.902160	4.33	.097840	24
37	.795259	2.63	.892839	1.67	.902420	4.32	.097580	23
38	.795417	2.63	.892739	1.68	.902679	4.32	.097321	22
39	.795575	2.63	.892638	1.70	.902938	4.32	.097062	21
40	9.795733	2.63	9.892536	1.68	9.903197	4.32	0.096803	20
41	.795891	2.63	.892435	1.68	.903456	4.30	.096544	19
42	.796049	2.62	.892334	1.68	.903714	4.32	.096286	18
43	.796206	2.63	.892233	1.68	.903973	4.32	.096027	17
44	.796364	2.62	.892132	1.70	.904232	4.32	.095768	16
45	9.796521	2.63	9.892030	1.68	9.904491	4.32	0.095509	15
46	.796679	2.62	.891929	1.70	.904750	4.30	.095250	14
47	.796836	2.62	.891827	1.68	.905008	4.32	.094992	13
48	.796993	2.62	.891726	1.70	.905267	4.32	.094733	12
49	.797150	2.62	.891624	1.68	.905526	4.32	.094474	11
50	9.797307	2.62	9.891523	1.70	9.905785	4.30	0.094215	10
51	.797464	2.62	.891421	1.70	.906043	4.32	.093957	9
52	.797621	2.60	.891319	1.70	.906302	4.30	.093698	8
53	.797777	2.62	.891217	1.70	.906560	4.32	.093440	7
54	.797934	2.62	.891115	1.70	.906819	4.30	.093181	6
55	9.798091	2.60	9.891013	1.70	9.907077	4.32	0.092923	5
56	.798247	2.60	.890911	1.70	.907336	4.30	.092664	4
57	.798403	2.62	.890809	1.70	.907594	4.32	.092406	3
58	.798560	2.60	.890707	1.70	.907853	4.30	.092147	2
59	.798716	2.60	.890605	1.70	.908111	4.30	.091889	1
60	9.798872		9.890503		9.908369		0.091631	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M

39°

140°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.798872	2.60	9.890503	1.72	9.908369	4.32	0.091631	60
1	.799028	2.60	.890400	1.70	.908628	4.30	.091372	59
2	.799184	2.58	.890298	1.72	.908886	4.30	.091114	58
3	.799339	2.60	.890195	1.70	.909144	4.30	.090856	57
4	.799495	2.60	.890093	1.72	.909402	4.30	.090598	56
5	9.799651	2.58	9.889990	1.70	9.909660	4.30	0.090340	55
6	.799806	2.60	.889888	1.72	.909918	4.32	.090082	54
7	.799962	2.58	.889785	1.72	.910177	4.30	.089823	53
8	.800117	2.58	.889682	1.72	.910435	4.30	.089565	52
9	.800272	2.58	.889579	1.70	.910693	4.30	.089307	51
10	9.800427	2.58	9.889477	1.72	9.910951	4.30	0.089049	50
11	.800582	2.58	.889374	1.72	.911209	4.30	.088791	49
12	.800737	2.58	.889271	1.72	.911467	4.30	.088533	48
13	.800892	2.58	.889168	1.73	.911725	4.28	.088275	47
14	.801047	2.57	.889064	1.72	.911982	4.30	.088018	46
15	9.801201	2.58	9.888961	1.72	9.912240	4.30	0.087760	45
16	.801356	2.58	.888858	1.72	.912498	4.30	.087502	44
17	.801511	2.57	.888755	1.73	.912756	4.30	.087244	43
18	.801665	2.57	.888651	1.72	.913014	4.28	.086986	42
19	.801819	2.57	.888548	1.73	.913271	4.30	.086729	41
20	9.801973	2.58	9.888444	1.72	9.913529	4.30	0.086471	40
21	.802128	2.57	.888341	1.73	.913787	4.28	.086213	39
22	.802282	2.57	.888237	1.72	.914044	4.30	.085956	38
23	.802436	2.55	.888134	1.73	.914302	4.30	.085698	37
24	.802589	2.57	.888030	1.73	.914560	4.28	.085440	36
25	9.802743	2.57	9.887926	1.73	9.914817	4.30	0.085183	35
26	.802897	2.55	.887822	1.73	.915075	4.28	.084925	34
27	.803050	2.57	.887718	1.73	.915332	4.30	.084668	33
28	.803204	2.55	.887614	1.73	.915590	4.28	.084410	32
29	.803357	2.57	.887510	1.73	.915847	4.28	.084153	31
30	9.803511	2.55	9.887406	1.73	9.916104	4.30	0.083896	30
31	.803664	2.55	.887302	1.73	.916362	4.28	.083638	29
32	.803817	2.55	.887198	1.75	.916619	4.30	.083381	28
33	.803970	2.55	.887093	1.73	.916877	4.28	.083123	27
34	.804123	2.55	.886989	1.73	.917134	4.28	.082866	26
35	9.804276	2.53	9.886885	1.75	9.917391	4.28	0.082609	25
36	.804428	2.55	.886780	1.73	.917648	4.30	.082352	24
37	.804581	2.55	.886676	1.75	.917906	4.28	.082094	23
38	.804734	2.53	.886571	1.75	.918163	4.28	.081837	22
39	.804886	2.55	.886466	1.73	.918420	4.28	.081580	21
40	9.805039	2.53	9.886362	1.75	9.918677	4.28	0.081323	20
41	.805191	2.53	.886257	1.75	.918934	4.28	.081066	19
42	.805343	2.53	.886152	1.75	.919191	4.28	.080809	18
43	.805495	2.53	.886047	1.75	.919448	4.28	.080552	17
44	.805647	2.53	.885942	1.75	.919705	4.28	.080295	16
45	9.805799	2.53	9.885837	1.75	9.919962	4.28	0.080038	15
46	.805951	2.53	.885732	1.75	.920219	4.28	.079781	14
47	.806103	2.52	.885627	1.75	.920476	4.28	.079524	13
48	.806254	2.53	.885522	1.77	.920733	4.28	.079267	12
49	.806406	2.52	.885416	1.75	.920990	4.28	.079010	11
50	9.806557	2.53	9.885311	1.77	9.921247	4.27	0.078753	10
51	.806709	2.52	.885205	1.75	.921503	4.28	.078497	9
52	.806860	2.52	.885100	1.77	.921760	4.28	.078240	8
53	.807011	2.53	.884994	1.75	.922017	4.28	.077983	7
54	.807163	2.52	.884889	1.77	.922274	4.27	.077726	6
55	9.807314	2.52	9.884783	1.77	9.922530	4.28	0.077470	5
56	.807465	2.50	.884677	1.75	.922787	4.28	.077213	4
57	.807615	2.52	.884572	1.77	.923044	4.27	.076956	3
58	.807766	2.52	.884466	1.77	.923300	4.28	.076700	2
59	.807917	2.50	.884360	1.77	.923557	4.28	.076443	1
60	9.808067		9.884254		9.923814		0.076186	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

129°

50°

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.808067	2.52	9.884254	1.77	9.923814	4.27	0.076186	60
1	.808218	2.50	.884148	1.77	.924070	4.28	.075930	59
2	.808368	2.52	.884042	1.77	.924327	4.27	.075673	58
3	.808519	2.50	.883936	1.78	.924583	4.28	.075417	57
4	.808669	2.50	.883829	1.77	.924840	4.27	.075160	56
5	9.808819	2.50	9.883723	1.77	9.925096	4.27	0.074904	55
6	.808969	2.50	.883617	1.78	.925352	4.28	.074648	54
7	.809119	2.50	.883510	1.77	.925609	4.27	.074391	53
8	.809269	2.50	.883404	1.78	.925865	4.28	.074135	52
9	.809419	2.50	.883297	1.77	.926122	4.27	.073878	51
10	9.809569	2.48	9.883191	1.78	9.926378	4.27	0.073622	50
11	.809718	2.50	.883084	1.78	.926634	4.27	.073366	49
12	.809868	2.48	.882977	1.77	.926890	4.28	.073110	48
13	.810017	2.50	.882871	1.78	.927147	4.27	.072853	47
14	.810167	2.48	.882764	1.78	.927403	4.27	.072597	46
15	9.810316	2.48	9.882657	1.78	9.927659	4.27	0.072341	45
16	.810465	2.48	.882550	1.78	.927915	4.27	.072085	44
17	.810614	2.48	.882443	1.78	.928171	4.27	.071829	43
18	.810763	2.48	.882336	1.78	.928427	4.28	.071573	42
19	.810912	2.48	.882229	1.80	.928684	4.27	.071316	41
20	9.811061	2.48	9.882121	1.78	9.928940	4.27	0.071060	40
21	.811210	2.47	.882014	1.78	.929196	4.27	.070804	39
22	.811358	2.48	.881907	1.80	.929452	4.27	.070548	38
23	.811507	2.47	.881799	1.78	.929708	4.27	.070292	37
24	.811655	2.48	.881692	1.80	.929964	4.27	.070036	36
25	9.811804	2.47	9.881584	1.78	9.930220	4.25	0.069780	35
26	.811952	2.47	.881477	1.80	.930475	4.27	.069525	34
27	.812100	2.47	.881369	1.80	.930731	4.27	.069269	33
28	.812248	2.47	.881261	1.80	.930987	4.27	.069013	32
29	.812396	2.47	.881153	1.78	.931243	4.27	.068757	31
30	9.812544	2.47	9.881046	1.80	9.931499	4.27	0.068501	30
31	.812692	2.47	.880938	1.80	.931755	4.25	.068245	29
32	.812840	2 47	.880830	1.80	.932010	4.27	.067990	28
33	.812988	2.45	.880722	1.82	.932266	4.27	.067734	27
34	.813135	2.47	.880613	1.80	.932522	4.27	.067478	26
35	9.813283	2.45	9.880505	1 80	9 932778	4.25	0.067222	25
36	.813430	2.47	.880397	1 80	.933033	4.27	.066967	24
37	.813578	2.45	.880289	1.82	.933289	4.27	.066711	23
38	.813725	2.45	.880180	1.80	.933545	4.25	.066455	22
39	.813872	2.45	.880072	1.82	.933800	4.27	.066200	21
40	9.814019	2.45	9.879963	1.80	9.934056	4.25	0.065944	20
41	.814166	2.45	.879855	1.82	.934311	4.27	.065689	19
42	.814313	2.45	.879746	1.82	.934567	4.25	.065433	18
43	.814460	2.45	.879637	1.80	.934822	4.27	.065178	17
44	.814607	2.43	.879529	1.82	.935078	4.25	.064922	16
45	9.814753	2.45	9.879420	1.82	9.935333	4.27	0.064667	15
46	.814900	2.43	.879311	1.82	.935589	4.25	.064411	14
47	.815046	2.45	.879202	1.82	.935844	4.27	.064156	13
48	.815193	2.43	.879093	1.82	.936100	4.25	.063900	12
49	.815339	2.43	.878984	1.82	.936355	4.27	.063645	11
50	9.815485	2.45	9.878875	1.82	9.936611	4.25	0.063389	10
51	.815632	2.43	.878766	1.83	.936866	4.25	.063134	9
52	.815778	2.43	.878656	1.82	.937121	4.27	.062879	8
53	.815924	2.42	.878547	1.82	.937377	4.25	.062623	7
54	.816069	2.43	.878438	1.83	.937632	4.25	.062368	6
55	9.816215	2.43	9.878328	1.82	9.937887	4.25	0.062113	5
56	.816361	2.43	.878219	1.83	.938142	4.27	.061858	4
57	.816507	2.42	.878109	1.83	.938398	4.25	.061602	3
58	.816652	2.43	.877999	1.82	.938653	4.25	.061347	2
59	.816798	2.42	.877890	1.83	.938908	4.25	.061092	1
60	9.816943		9.877780		9.939163		0.060837	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.816943	2.42	9.877780	1.83	9.939163	4.25	0.060837	60
1	.817088	2.42	.877670	1.83	.939418	4.25	.060582	59
2	.817233	2.43	.877560	1.83	.939673	4.25	.060327	58
3	.817379	2.42	.877450	1.83	.939928	4.25	.060072	57
4	.817524	2.40	.877340	1.83	.940183	4.27	.059817	56
5	9.817668	2.42	9.877230	1.83	9.940439	4.25	0.059561	55
6	.817813	2.42	.877120	1.83	.940694	4.25	.059306	54
7	.817958	2.42	.877010	1.85	.940949	4.25	.059051	53
8	.818103	2.40	.876899	1.83	.941204	4.25	.058796	52
9	.818247	2.42	.876789	1.85	.941459	4.23	.058541	51
10	9.818392	2.40	9.876678	1.83	9.941713	4.25	0.058287	50
11	.818536	2.42	.876568	1.85	.941968	4.25	.058032	49
12	.818681	2.40	.876457	1.83	.942223	4.25	.057777	48
13	.818825	2.40	.876347	1.85	.942478	4.25	.057522	47
14	.818969	2.40	.876236	1.85	.942733	4.25	.057267	46
15	9.819113	2.40	9.876125	1.85	9.942988	4.25	0.057012	45
16	.819257	2.40	.876014	1.83	.943243	4.25	.056757	44
17	.819401	2.40	.875904	1.85	.943498	4.23	.056502	43
18	.819545	2.40	.875793	1.85	.943752	4.25	.056248	42
19	.819689	2.38	.875682	1.85	.944007	4.25	.055993	41
20	9.819832	2.40	9.875571	1.87	9.944262	4.25	0.055738	40
21	.819976	2.40	.875459	1.85	.944517	4.23	.055483	39
22	.820120	2.38	.875348	1.85	.944771	4.25	.055229	38
23	.820263	2.38	.875237	1.85	.945026	4.25	.054974	37
24	.820406	2.40	.875126	1.87	.945281	4.23	.054719	36
25	9.820550	2.38	9.875014	1.85	9.945535	4.25	0.054465	35
26	.820693	2.38	.874903	1.87	.945790	4.25	.054210	34
27	.820836	2.38	.874791	1.85	.946045	4.23	.053955	33
28	.820979	2.38	.874680	1.87	.946299	4.25	.053701	32
29	.821122	2.38	.874568	1.87	.946554	4.23	.053446	31
30	9.821265	2.37	9.874456	1.87	9.946808	4.25	0.053192	30
31	.821407	2.38	.874344	1.87	.947063	4.25	.052937	29
32	.821550	2.38	.874232	1.85	.947318	4.23	.052682	28
33	.821693	2.37	.874121	1.87	.947572	4.25	.052428	27
34	.821835	2.37	.874009	1.88	.947827	4.23	.052173	26
35	9.821977	2.38	9.873896	1.87	9.948081	4.23	0.051919	25
36	.822120	2.37	.873784	1.87	.948335	4.25	.051665	24
37	.822262	2.37	.873672	1.87	.948590	4.23	.051410	23
38	.822404	2.37	.873560	1.87	.948844	4.25	.051156	22
39	.822546	2.37	.873448	1.88	.949099	4.23	.050901	21
40	9.822688	2.37	9.873335	1.87	9.949353	4.25	0.050647	20
41	.822830	2.37	.873223	1.88	.949608	4.23	.050392	19
42	.822972	2.37	.873110	1.87	.949862	4.23	.050138	18
43	.823114	2.35	.872998	1.88	.950116	4.25	.049884	17
44	.823255	2.37	.872885	1.88	.950371	4.23	.049629	16
45	9.823397	2.37	9.872772	1.88	9.950625	4.23	0.049375	15
46	.823539	2.35	.872659	1.87	.950879	4.23	.049121	14
47	.823680	2.35	.872547	1.88	.951133	4.25	.048867	13
48	.823821	2.37	.872434	1.88	.951388	4.23	.048612	12
49	.823963	2.35	.872321	1.88	.951642	4.23	.048358	11
50	9.824104	2.35	9.872208	1.88	9.951896	4.23	0.048104	10
51	.824245	2.35	.872095	1.90	.952150	4.25	.047850	9
52	.824386	2.35	.871981	1.88	.952405	4.23	.047595	8
53	.824527	2.35	.871868	1.88	.952659	4.23	.047341	7
54	.824668	2.33	.871755	1.90	.952913	4.23	.047087	6
55	9.824808	2.35	9.871641	1.88	9.953167	4.23	0.046833	5
56	.824949	2.35	.871528	1.90	.953421	4.23	.046579	4
57	.825090	2.33	.871414	1.88	.953675	4.23	.046325	3
58	.825230	2.35	.871301	1.90	.953929	4.23	.046071	2
59	.825371	2.33	.871187	1.90	.954183	4.23	.045817	1
60	9.825511		9.871073		9.954437		0.045563	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1".	Cos.	D. 1".	Tan.	D. 1".	Cot.	
0	9.825511	2.33	9.871073	1.88	9.954437	4.23	0.045563	60
1	.825651	2.33	.870960	1.90	.954691	4.25	.045309	59
2	.825791	2.33	.870846	1.90	.954946	4.23	.045054	58
3	.825931	2.33	.870732	1.90	.955200	4.23	.044800	57
4	.826071	2.33	.870618	1.90	.955454	4.23	.044546	56
5	9.826211	2.33	9.870504	1.90	9.955708	4.22	0.044292	55
6	.826351	2.33	.870390	1.90	.955961	4.23	.044039	54
7	.826491	2.33	.870276	1.92	.956215	4.23	.043785	53
8	.826631	2.32	.870161	1.90	.956469	4.23	.043531	52
9	.826770	2.33	.870047	1.90	.956723	4.23	.043277	51
10	9.826910	2.32	9.869933	1.92	9.956977	4.23	0.043023	50
11	.827049	2.33	.869818	1.90	.957231	4.23	.042769	49
12	.827189	2.32	.869704	1.92	.957485	4.23	.042515	48
13	.827328	2.32	.869589	1.92	.957739	4.23	.042261	47
14	.827467	2.32	.869474	1.90	.957993	4.23	.042007	46
15	9.827606	2.32	9.869360	1.92	9.958247	4.22	0.041753	45
16	.827745	2.32	.869245	1.92	.958500	4.23	.041500	44
17	.827884	2.32	.869130	1.92	.958754	4.23	.041246	43
18	.828023	2.32	.869015	1.92	.959008	4.23	.040992	42
19	.828162	2.32	.868900	1.92	.959262	4.23	.040738	41
20	9.828301	2.30	9.868785	1.92	9.959516	4.22	0.040484	40
21	.828439	2.32	.868670	1.92	.959769	4.23	.040231	39
22	.828578	2.30	.868555	1.92	.960023	4.23	.039977	38
23	.828716	2.32	.868440	1.93	.960277	4.22	.039723	37
24	.828855	2.30	.868324	1.92	.960530	4.23	.039470	36
25	9.828993	2.30	9.868209	1.93	9.960784	4.23	0.039216	35
26	.829131	2.30	.868093	1.92	.961038	4.23	.038962	34
27	.829269	2.30	.867978	1.93	.961292	4.22	.038708	33
28	.829407	2.30	.867862	1.92	.961545	4.23	.038455	32
29	.829545	2.30	.867747	1.93	.961799	4.22	.038201	31
30	9.829683	2.30	9.867631	1.93	9.962052	4.23	0.037948	30
31	.829821	2.30	.867515	1.93	.962306	4.23	.037694	29
32	.829959	2.30	.867399	1.93	.962560	4.22	.037440	28
33	.830097	2.28	.867283	1.93	.962813	4.23	.037187	27
34	.830234	2.30	.867167	1.93	.963067	4.22	.036933	26
35	9.830372	2.28	9.867051	1.93	9.963320	4.23	0.036680	25
36	.830509	2.28	.866935	1.93	.963574	4.23	.036426	24
37	.830646	2.30	.866819	1.93	.963828	4.22	.036172	23
38	.830784	2.28	.866703	1.95	.964081	4.23	.035919	22
39	.830921	2.28	.866586	1.93	.964335	4.22	.035665	21
40	9.831058	2.28	9.866470	1.95	9.964588	4.23	0.035412	20
41	.831195	2.28	.866353	1.93	.964842	4.22	.035158	19
42	.831332	2.28	.866237	1.95	.965095	4.23	.034905	18
43	.831469	2.28	.866120	1.93	.965349	4.22	.034651	17
44	.831606	2.27	.866004	1.95	.965602	4.22	.034398	16
45	9.831742	2.28	9.865887	1.95	9.965855	4.23	0.034145	15
46	.831879	2.27	.865770	1.95	.966109	4.22	.033891	14
47	.832015	2.28	.865653	1.95	.966362	4.23	.033638	13
48	.832152	2.27	.865536	1.95	.966616	4.22	.033384	12
49	.832288	2.28	.865419	1.95	.966869	4.23	.033131	11
50	9.832425	2.27	9.865302	1.95	9.967123	4.22	0.032877	10
51	.832561	2.27	.865185	1.95	.967376	4.22	.032624	9
52	.832697	2.27	.865068	1.97	.967629	4.23	.032371	8
53	.832833	2.27	.864950	1.95	.967883	4.22	.032117	7
54	.832969	2.27	.864833	1.95	.968136	4.22	.031864	6
55	9.833105	2.27	9.864716	1.97	9.968389	4.23	0.031611	5
56	.833241	2.27	.864598	1.95	.968643	4.22	.031357	4
57	.833377	2.25	.864481	1.97	.968896	4.22	.031104	3
58	.833512	2.27	.864363	1.97	.969149	4.23	.030851	2
59	.833648	2.25	.864245	1.97	.969403	4.22	.030597	1
60	9.833783		9.864127		9.969656		0.030344	0
	Cos.	D. 1".	Sin.	D. 1".	Cot.	D. 1".	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.833783	2.27	9.864127	1.95	9.969656	4.22	0.030344	60
1	.833919	2.25	.864010	1.97	.969909	4.22	.030091	59
2	.834054	2.25	.863892	1.97	.970162	4.23	.029838	58
3	.834189	2.27	.863774	1.97	.970416	4.22	.029584	57
4	.834325	2.25	.863656	1.97	.970669	4.22	.029331	56
5	9.834460	2.25	9.863538	1.98	9.970922	4.22	0.029078	55
6	.834595	2.25	.863419	1.97	.971175	4.23	.028825	54
7	.834730	2.25	.863301	1.97	.971429	4.22	.028571	53
8	.834865	2.23	.863183	1.98	.971682	4.22	.028318	52
9	.834999	2.25	.863064	1.97	.971935	4.22	.028065	51
10	9.835134	2.25	9.862946	1.98	9.972188	4.22	0.027812	50
11	.835269	2.23	.862827	1.97	.972441	4.23	.027559	49
12	.835403	2.25	.862709	1.98	.972695	4.22	.027305	48
13	.835538	2.23	.862590	1.98	.972948	4.22	.027052	47
14	.835672	2.25	.862471	1.97	.973201	4.22	.026799	46
15	9.835807	2.23	9.862353	1.98	9.973454	4.22	0.026546	45
16	.835941	2.23	.862234	1.98	.973707	4.22	.026293	44
17	.836075	2.23	.862115	1.98	.973960	4.22	.026040	43
18	.836209	2.23	.861996	1.98	.974213	4.22	.025787	42
19	.836343	2.23	.861877	1.98	.974466	4.23	.025534	41
20	9.836477	2.23	9.861758	2.00	9.974720	4.22	0.025280	40
21	.836611	2.23	.861638	1.98	.974973	4.22	.025027	39
22	.836745	2.22	.861519	1.98	.975226	4.22	.024774	38
23	.836878	2.23	.861400	2.00	.975479	4.22	.024521	37
24	.837012	2.23	.861280	1.98	.975732	4.22	.024268	36
25	9.837146	2.22	9.861161	2.00	9.975985	4.22	0.024015	35
26	.837279	2.22	.861041	1.98	.976238	4.22	.023762	34
27	.837412	2.23	.860922	2.00	.976491	4.22	.023509	33
28	.837546	2.22	.860802	2.00	.976744	4.22	.023256	32
29	.837679	2.22	.860682	2.00	.976997	4.22	.023003	31
30	9.837812	2.22	9.860562	2.00	9.977250	4.22	0.022750	30
31	.837945	2.22	.860442	2.00	.977503	4.22	.022497	29
32	.838078	2.22	.860322	2.00	.977756	4.22	.022244	28
33	.838211	2.22	.860202	2.00	.978009	4.22	.021991	27
34	.838344	2.22	.860082	2.00	.978262	4.22	.021738	26
35	9.838477	2.22	9.859962	2.00	9.978515	4.22	0.021485	25
36	.838610	2.20	.859842	2.02	.978768	4.22	.021232	24
37	.838742	2.22	.859721	2.00	.979021	4.22	.020979	23
38	.838875	2.20	.859601	2.02	.979274	4.22	.020726	22
39	.839007	2.22	.859480	2.00	.979527	4.22	.020473	21
40	9.839140	2.20	9.859360	2.02	9.979780	4.22	0.020220	20
41	.839272	2.20	.859239	2.00	.980033	4.22	.019967	19
42	.839404	2.20	.859119	2.02	.980286	4.20	.019714	18
43	.839536	2.20	.858998	2.02	.980538	4.22	.019462	17
44	.839668	2.20	.858877	2.02	.980791	4.22	.019209	16
45	9.839800	2.20	9.858756	2.02	9.981044	4.22	0.018956	15
46	.839932	2.20	.858635	2.02	.981297	4.22	.018703	14
47	.840064	2.20	.858514	2.02	.981550	4.22	.018450	13
48	.840196	2.20	.858393	2.02	.981803	4.22	.018197	12
49	.840328	2.18	.858272	2.02	.982056	4.22	.017944	11
50	9.840459	2.20	9.858151	2.03	9.982309	4.22	0.017691	10
51	.840591	2.18	.858029	2.02	.982562	4.20	.017438	9
52	.840722	2.20	.857908	2.03	.982814	4.22	.017186	8
53	.840854	2.18	.857786	2.02	.983067	4.22	.016933	7
54	.840985	2.18	.857665	2.03	.983320	4.22	.016680	6
55	9.841116	2.18	9.857543	2.02	9.983573	4.22	0.016427	5
56	.841247	2.18	.857422	2.03	.983826	4.22	.016174	4
57	.841378	2.18	.857300	2.03	.984079	4.22	.015921	3
58	.841509	2.18	.857178	2.03	.984332	4.20	.015668	2
59	.841640	2.18	.857056	2.03	.984584	4.22	.015416	1
60	9.841771		9.856934		9.984837		0.015163	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

M.	Sin.	D. 1″.	Cos.	D. 1″.	Tan.	D. 1″.	Cot.	
0	9.841771	2.18	9.856934	2.03	9.984837	4.22	0.015163	60
1	.841902	2.18	.856812	2.03	.985090	4.22	.014910	59
2	.842033	2.17	.856690	2.03	.985343	4.22	.014657	58
3	.842163	2.18	.856568	2.03	.985595	4.20	.014404	57
4	.842294	2.17	.856446	2.05	.985848	4.22	.014152	56
5	9.842424	2.18	9.856323	2.03	9.986101	4.22	0.013899	55
6	.842555	2.17	.856201	2.05	.986354	4.22	.013646	54
7	.842685	2.17	.856078	2.03	.986607	4.22	.013393	53
8	.842815	2.18	.855956	2.05	.986860	4.20	.013140	52
9	.842946	2.17	.855833	2.03	.987112	4.22	.012888	51
10	9.843076	2.17	9.855711	2.05	9.987365	4.22	0.012635	50
11	.843206	2.17	.855588	2.05	.987618	4.22	.012382	49
12	.843336	2.17	.855465	2.05	.987871	4.20	.012129	48
13	.843466	2.15	.855342	2.05	.988123	4.22	.011877	47
14	.843595	2.17	.855219	2.05	.988376	4.22	.011624	46
15	9.843725	2.17	9.855096	2.05	9.988629	4.22	0.011371	45
16	.843855	2.15	.854973	2.05	.988882	4.20	.011118	44
17	.843984	2.17	.854850	2.05	.989134	4.22	.010866	43
18	.844114	2.15	.854727	2.07	.989387	4.22	.010613	42
19	.844243	2.15	.854603	2.05	.989640	4.22	.010360	41
20	9.844372	2.17	9.854480	2.07	9.989893	4.20	0.010107	40
21	.844502	2.15	.854356	2.05	.990145	4.22	.009855	39
22	.844631	2.15	.854233	2.07	.990398	4.22	.009602	38
23	.844760	2.15	.854109	2.05	.990651	4.20	.009349	37
24	.844889	2.15	.853986	2.07	.990903	4.22	.009097	36
25	9.845018	2.15	9.853862	2.07	9.991156	4.22	0.008844	35
26	.845147	2.15	.853738	2.07	.991409	4.22	.008591	34
27	.845276	2.15	.853614	2.07	.991662	4.20	.008338	33
28	.845405	2.13	.853490	2.07	.991914	4.22	.008086	32
29	.845533	2.15	.853366	2.07	.992167	4.22	.007833	31
30	9.845662	2.13	9.853242	2.07	9.992420	4.20	0.007580	30
31	.845790	2.15	.853118	2.07	.992672	4.22	.007328	29
32	.845919	2.13	.852994	2.08	.992925	4.22	.007075	28
33	.846047	2.13	.852869	2.07	.993178	4.22	.006822	27
34	.846175	2.15	.852745	2.08	.993431	4.20	.006569	26
35	9.846304	2.13	9.852620	2.07	9.993683	4.22	0.006317	25
36	.846432	2.13	.852496	2.08	.993936	4.22	.006064	24
37	846560	2.13	.852371	2.07	.994189	4.20	.005811	23
38	.846688	2.13	.852247	2.08	.994441	4.22	.005559	22
39	.846816	2.13	.852122	2.08	.994694	4.22	.005306	21
40	9.846944	2.12	9.851997	2.08	9.994947	4.20	0.005053	20
41	.847071	2.13	.851872	2.08	.995199	4.22	.004801	19
42	.847199	2.13	.851747	2.08	.995452	4.22	.004548	18
43	.847327	2.12	.851622	2.08	.995705	4.20	.004295	17
44	.847454	2.13	.851497	2.08	.995957	4.22	.004043	16
45	9.847582	2.12	9.851372	2.10	9.996210	4.22	0.003790	15
46	.847709	2.12	.851246	2.08	.996463	4.20	.003537	14
47	.847836	2.13	.851121	2.08	.996715	4.22	.003285	13
48	.847964	2.12	.850996	2.10	.996968	4.22	.003032	12
49	.848091	2.12	.850870	2.08	.997221	4.20	.002779	11
50	9.848218	2.12	9.850745	2.10	9.997473	4.22	0.002527	10
51	.848345	2.12	.850619	2.10	.997726	4.22	.002274	9
52	.848472	2.12	.850493	2.08	.997979	4.20	.002021	8
53	.848599	2.12	.850368	2.10	.998231	4.22	.001769	7
54	.848726	2.10	.850242	2.10	.998484	4.22	.001516	6
55	9.848852	2.12	9.850116	2.10	9.998737	4.20	0.001263	5
56	.848979	2.12	.849990	2.10	.998989	4.22	.001011	4
57	.849106	2.10	.849864	2.10	.999242	4.22	.000758	3
58	.849232	2.12	.849738	2.12	.999495	4.20	.000505	2
59	.849359	2.10	.849611	2.10	.999747	4.22	.000253	1
60	9.849485		9.849485		0.000000		0.000000	0
	Cos.	D. 1″.	Sin.	D. 1″.	Cot.	D. 1″.	Tan.	M.

TABLE XIV.—AUXILIARY TABLE FOR LOGARITHMIC

	0°			1°			2°			
M.	S.	Sin.	Tan.	S.	Sin.	Tan.	S.	Sin.	Tan.	M.
		4.68			4.68			4.68		
0	0	5575	5575	3600	5553	5619	7200	5487	5751	0
1	60	5575	5575	3660	5552	5620	7260	5485	5754	1
2	120	5575	5575	3720	5551	5622	7320	5484	5757	2
3	180	5575	5575	3780	5551	5623	7380	5482	5760	3
4	240	5575	5575	3840	5550	5625	7440	5481	5763	4
5	300	5575	5575	3900	5549	5627	7500	5479	5766	5
6	360	5575	5575	3960	5548	5628	7560	5478	5769	6
7	420	5575	5575	4020	5547	5630	7620	5476	5773	7
8	480	5574	5576	4080	5547	5632	7680	5475	5776	8
9	540	5574	5576	4140	5546	5633	7740	5473	5779	9
10	600	5574	5576	4200	5545	5635	7800	5471	5782	10
11	660	5574	5576	4260	5544	5637	7860	5470	5785	11
12	720	5574	5577	4320	5543	5638	7920	5468	5788	12
13	780	5574	5577	4380	5542	5640	7980	5467	5792	13
14	840	5574	5577	4440	5541	5642	8040	5465	5795	14
15	900	5573	5578	4500	5540	5644	8100	5463	5798	15
16	960	5573	5578	4560	5539	5646	8160	5462	5802	16
17	1020	5573	5578	4620	5539	5648	8220	5460	5805	17
18	1080	5573	5579	4680	5538	5649	8280	5458	5808	18
19	1140	5573	5579	4740	5537	5651	8340	5457	5812	19
20	1200	5572	5580	4800	5536	5653	8400	5455	5815	20
21	1260	5572	5580	4860	5535	5655	8460	5453	5818	21
22	1320	5572	5581	4920	5534	5657	8520	5451	5822	22
23	1380	5572	5581	4980	5533	5659	8580	5450	5825	23
24	1440	5571	5582	5040	5532	5661	8640	5448	5829	24
25	1500	5571	5583	5100	5531	5663	8700	5446	5833	25
26	1560	5571	5583	5160	5530	5665	8760	5444	5836	26
27	1620	5570	5584	5220	5529	5668	8820	5443	5840	27
28	1680	5570	5584	5280	5527	5670	8880	5441	5843	28
29	1740	5570	5585	5340	5526	5672	8940	5439	5847	29
30	1800	5569	5586	5400	5525	5674	9000	5437	5851	30
31	1860	5569	5587	5460	5524	5676	9060	5435	5854	31
32	1920	5569	5587	5520	5523	5679	9120	5433	5858	32
33	1980	5568	5588	5580	5522	5681	9180	5431	5862	33
34	2040	5568	5589	5640	5521	5683	9240	5430	5866	34
35	2100	5567	5590	5700	5520	5685	9300	5428	5869	35
36	2160	5567	5591	5760	5518	5688	9360	5426	5873	36
37	2220	5566	5592	5820	5517	5690	9420	5424	5877	37
38	2280	5566	5593	5880	5516	5693	9480	5422	5881	38
39	2340	5566	5593	5940	5515	5695	9540	5420	5885	39
40	2400	5565	5594	6000	5514	5697	9600	5418	5889	40
41	2460	5565	5595	6060	5512	5700	9660	5416	5893	41
42	2520	5564	5596	6120	5511	5702	9720	5414	5897	42
43	2580	5564	5598	6180	5510	5705	9780	5412	5900	43
44	2640	5563	5599	6240	5509	5707	9840	5410	5905	44
45	2700	5562	5600	6300	5507	5710	9900	5408	5909	45
46	2760	5562	5601	6360	5506	5713	9960	5406	5913	46
47	2820	5561	5602	6420	5505	5715	10020	5404	5917	47
48	2880	5561	5603	6480	5503	5718	10080	5402	5921	48
49	2940	5560	5604	6540	5502	5720	10140	5400	5925	49
50	3000	5560	5605	6600	5501	5723	10200	5398	5929	50
51	3060	5559	5607	6660	5499	5726	10260	5396	5933	51
52	3120	5558	5608	6720	5498	5729	10320	5394	5937	52
53	3180	5558	5609	6780	5497	5731	10380	5392	5942	53
54	3240	5557	5611	6840	5495	5734	10440	5389	5946	54
55	3300	5556	5612	6900	5494	5737	10500	5387	5950	55
56	3360	5556	5613	6960	5492	5740	10560	5385	5955	56
57	3420	5555	5615	7020	5491	5743	10620	5383	5959	57
58	3480	5554	5616	7080	5490	5745	10680	5381	5963	58
59	3540	5554	5618	7140	5488	5748	10740	5379	5968	59
60	3600	5553	5619	7200	5487	5751	10800	5376	5972	60
M.	S.	Sin.	Tan.	S.	Sin.	Tan.	S.	Sin.	Tan.	M.

SINES AND TANGENTS OF SMALL ANGLES.

	3°			4°			5°			
M.	S.	Sin.	Tan.	S.	Sin.	Tan.	S.	Sin.	Tan.	M.
		4.68			4.68			4.68		
0	10800	5376	5972	14400	5222	6281	18000	5024	6679	0
1	10860	5374	5976	14460	5219	6287	18060	5020	6687	1
2	10920	5372	5981	14520	5216	6293	18120	5016	6694	2
3	10980	5370	5985	14580	5213	6299	18180	5012	6702	3
4	11040	5367	5990	14640	5210	6305	18240	5009	6709	4
5	11100	5365	5994	14700	5207	6311	18300	5005	6716	5
6	11160	5363	5999	14760	5204	6317	18360	5001	6724	6
7	11220	5361	6004	14820	5201	6323	18420	4997	6732	7
8	11280	5358	6008	14880	5198	6329	18480	4994	6739	8
9	11340	5356	6013	14940	5195	6335	18540	4990	6747	9
10	11400	5354	6017	15000	5192	6341	18600	4986	6754	10
11	11460	5351	6022	15060	5189	6348	18660	4982	6762	11
12	11520	5349	6027	15120	5186	6354	18720	4978	6770	12
13	11580	5347	6031	15180	5183	6360	18780	4975	6777	13
14	11640	5344	6036	15240	5180	6366	18840	4971	6785	14
15	11700	5342	6041	15300	5177	6372	18900	4967	6793	15
16	11760	5340	6046	15360	5173	6379	18960	4963	6800	16
17	11820	5337	6051	15420	5170	6385	19020	4959	6808	17
18	11880	5335	6055	15480	5167	6391	19080	4955	6816	18
19	11940	5332	6060	15540	5164	6398	19140	4951	6824	19
20	12000	5330	6065	15600	5161	6404	19200	4948	6832	20
21	12060	5327	6070	15660	5158	6410	19260	4944	6840	21
22	12120	5325	6075	15720	5154	6417	19320	4940	6848	22
23	12180	5322	6080	15780	5151	6423	19380	4936	6855	23
24	12240	5320	6085	15840	5148	6430	19440	4932	6863	24
25	12300	5317	6090	15900	5145	6436	19500	4928	6871	25
26	12360	5315	6095	15960	5141	6443	19560	4924	6879	26
27	12420	5312	6100	16020	5138	6449	19620	4920	6887	27
28	12480	5310	6105	16080	5135	6456	19680	4916	6896	28
29	12540	5307	6110	16140	5132	6463	19740	4912	6904	29
30	12600	5305	6116	16200	5128	6469	19800	4908	6912	30
31	12660	5302	6121	16260	5125	6476	19860	4904	6920	31
32	12720	5300	6126	16320	5122	6482	19920	4900	6928	32
33	12780	5297	6131	16380	5118	6489	19980	4895	6936	33
34	12840	5294	6136	16440	5115	6496	20040	4891	6944	34
35	12900	5292	6142	16500	5112	6503	20100	4887	6953	35
36	12960	5289	6147	16560	5108	6509	20160	4883	6961	36
37	13020	5286	6152	16620	5105	6516	20220	4880	6969	37
38	13080	5284	6158	16680	5101	6523	20280	4875	6977	38
39	13140	5281	6163	16740	5098	6530	20340	4871	6986	39
40	13200	5278	6168	16800	5095	6537	20400	4867	6994	40
41	13260	5276	6174	16860	5091	6544	20460	4862	7003	41
42	13320	5273	6179	16920	5088	6551	20520	4858	7011	42
43	13380	5270	6185	16980	5084	6557	20580	4854	7019	43
44	13440	5268	6190	17040	5081	6564	20640	4850	7028	44
45	13500	5265	6196	17100	5077	6571	20700	4846	7036	45
46	13560	5262	6201	17160	5074	6578	20760	4841	7045	46
47	13620	5259	6207	17220	5070	6585	20820	4837	7053	47
48	13680	5256	6212	17280	5067	6593	20880	4833	7062	48
49	13740	5254	6218	17340	5063	6600	20940	4829	7070	49
50	13800	5251	6224	17400	5060	6607	21000	4824	7079	50
51	13860	5248	6229	17460	5056	6614	21060	4820	7088	51
52	13920	5245	6235	17520	5053	6621	21120	4816	7096	52
53	13980	5242	6241	17580	5049	6628	21180	4811	7105	53
54	14040	5239	6246	17640	5045	6635	21240	4807	7114	54
55	14100	5237	6252	17700	5042	6643	21300	4803	7122	55
56	14160	5234	6258	17760	5038	6650	21360	4798	7131	56
57	14220	5231	6264	17820	5034	6657	21420	4794	7140	57
58	14280	5228	6269	17880	5031	6665	21480	4790	7149	58
59	14340	5225	6275	17940	5027	6672	21540	4785	7158	59
60	14400	5222	6281	18000	5024	6679	21600	4781	7166	60
M.	S.	Sin.	Tan.	S.	Sin.	Tan.	S.	Sin.	Tan.	M.

TABLE XV.—LOGARITHMIC VERSED SINES

0°					1°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	∞		∞		0	6.182714	239.28	6.182780	239.32
1	2.626422	10034.33	2.626422	10034.33	1	.197071	235.38	.197139	235.42
2	3.228482	5869.72	3.228482	5869.72	2	.211194	231.62	.211264	231.67
3	.580665	4164.62	.580665	4164.62	3	.225091	227.98	.225164	228.02
4	.830542	3230.33	.830542	3230.35	4	.238770	224.43	.238845	224.48
5	4.024362	2639.38	4.024363	2639.37	5	6.252236	221.02	6.252314	221.05
6	.182725	2231.55	.182725	2231.57	6	.265497	217.68	.265577	217.73
7	.316618	1933.07	.316619	1933.07	7	.278558	214.47	.278641	214.50
8	.432602	1705.08	.432603	1705.08	8	.291426	211.33	.291511	211.37
9	.534907	1525.25	.534908	1525.27	9	.304106	208.28	.304193	208.33
10	4.626422	1379.75	4.626424	1379.75	10	6.316603	205.33	6.316693	205.38
11	.709207	1259.62	.709209	1259.63	11	.328923	202.47	.329016	202.52
12	.784784	1158.73	.784787	1158.75	12	.341071	199.68	.341167	199.72
13	.854308	1072.83	.854312	1072.82	13	.353052	196.95	.353150	197.00
14	.918678	998.77	.918681	998.78	14	.364869	194.32	.364970	194.35
15	4.978604	934.28	4.978608	934.30	15	6.376528	191.73	6.376631	191.78
16	5.034661	877.63	5.034666	877.65	16	.388032	189.23	.388138	189.27
17	.087319	827.45	.087325	827.45	17	.399386	186.78	.399494	186.85
18	.136966	782.70	.136972	782.72	18	.410593	184.40	.410705	184.45
19	.183928	742.55	.183935	742.55	19	.421657	182.10	.421772	182.13
20	5.228481	706.30	5.228488	706.33	20	6.432583	179.82	6.432700	179.88
21	.270859	673.45	.270868	673.45	21	.443372	177.62	.443493	177.67
22	.311266	643.50	.311275	643.52	22	.454029	175.47	.454153	175.52
23	.349876	616.12	.349886	616.13	23	.464557	173.37	.464684	173.42
24	.386843	590.95	.386854	590.97	24	.474959	171.32	.475089	171.37
25	5.422300	567.78	5.422312	567.78	25	6.485238	169.30	6.485371	169.35
26	.456367	546.35	.456379	546.37	26	.495396	167.37	.495532	167.42
27	.489148	526.47	.489161	526.48	27	.505438	165.43	.505577	165.48
28	.520736	508.00	.520750	508.02	28	.515364	163.57	.515506	163.63
29	.551216	490.77	.551231	490.80	29	.525178	161.73	.525324	161.78
30	5.580662	474.68	5.580679	474.68	30	6.534882	159.97	6.535031	160.02
31	.609143	459.60	.609160	459.63	31	.544480	158.20	.544632	158.27
32	.636719	445.47	.636738	445.48	32	.553972	156.50	.554128	156.55
33	.663447	432.17	.663467	432.18	33	.563362	154.82	.563521	154.87
34	.689377	419.63	.689398	419.65	34	.572651	153.18	.572813	153.25
35	5.714555	407.80	5.714577	407.83	35	6.581842	151.57	6.582008	151.63
36	.739023	396.63	.739047	396.67	36	.590936	150.02	.591106	150.07
37	.762821	386.07	.762847	386.08	37	.599937	148.47	.600110	148.52
38	.785985	376.03	.786012	376.05	38	.608845	146.97	.609021	147.03
39	.808547	366.50	.808575	366.53	39	.617663	145.48	.617843	145.53
40	5.830537	357.47	5.830567	357.48	40	6.626392	144.03	6.626575	144.10
41	.851985	348.83	.852016	348.87	41	.635034	142.62	.635221	142.68
42	.872915	340.63	.872948	340.65	42	.643591	141.22	.643782	141.28
43	.893353	332.82	.893387	332.83	43	.652064	139.87	.652259	139.93
44	.913322	325.32	.913357	325.35	44	.660456	138.52	.660655	138.58
45	5.932841	318.17	5.932878	318.20	45	6.668767	137.22	6.668970	137.27
46	.951931	311.33	.951970	311.37	46	.677000	135.92	.677206	135.97
47	.970611	304.78	.970652	304.80	47	.685155	134.65	.685365	134.72
48	.988898	298.48	.988940	298.52	48	.693234	133.42	.693448	133.48
49	6.006807	292.47	6.006851	292.50	49	.701239	132.20	.701457	132.27
50	6.024355	286.67	6.024401	286.68	50	6.709171	130.98	6.709393	131.07
51	.041555	281.10	.041602	281.13	51	.717030	129.82	.717257	129.88
52	.058421	275.73	.058470	275.78	52	.724820	128.67	.725050	128.75
53	.074965	270.60	.075017	270.62	53	.732540	127.53	.732775	127.60
54	.091201	265.62	.091254	265.67	54	.740192	126.42	.740431	126.48
55	6.107138	260.85	6.107194	260.87	55	6.747777	125.33	6.748020	125.40
56	.122789	256.22	.122846	256.27	56	.755297	124.25	.755544	124.33
57	.138162	251.77	.138222	251.80	57	.762752	123.20	.763004	123.27
58	.153268	247.47	.153330	247.50	58	.770144	122.15	.770400	122.22
59	.168116	243.30	.168180	243.33	59	.777473	121.13	.777733	121.20
60	6.182714		6.182780		60	6.784741		6.785005	

2°					3°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	6.784741	120.12	6.785005	120.20	0	7.136868	80.18	7.137464	80.28
1	.791948	119.13	.792217	119.22	1	.141679	79.75	.142281	79.85
2	.799096	118.17	.799370	118.23	2	.146464	79.30	.147072	79.42
3	.806186	117.22	.806464	117.28	3	.151222	78.87	.151837	79.00
4	.813219	116.25	.813501	116.35	4	.155954	78.45	.156577	78.55
5	6.820194	115.35	6.820482	115.40	5	7.160661	78.02	7.161290	78.13
6	.827115	114.42	.827406	114.52	6	.165342	77.60	.165978	77.72
7	.833980	113.53	.834277	113.60	7	.169998	77.20	.170641	77.30
8	.840792	112.65	.841093	112.73	8	.174630	76.77	.175279	76.90
9	.847551	111.77	.847857	111.85	9	.179236	76.38	.179893	76.50
10	6.854257	110.92	6.854568	111.00	10	7.183819	75.97	7.184483	76.08
11	.860912	110.08	.861228	110.15	11	.188377	75.58	.189048	75.68
12	.867517	109.23	.867837	109.32	12	.192912	75.18	.193589	75.32
13	.874071	108.43	.874396	108.52	13	.197423	74.78	.198108	74.90
14	.880577	107.62	.880907	107.70	14	.201910	74.42	.202602	74.53
15	6.887034	106.82	6.887369	106.90	15	7.206375	74.03	7.207074	74.15
16	.893443	106.05	.893783	106.13	16	.210817	73.65	.211523	73.77
17	.899806	105.27	.900151	105.35	17	.215236	73.28	.215949	73.40
18	.906122	104.52	.906472	104.60	18	.219633	72.90	.220353	73.03
19	.912393	103.75	.912748	103.85	19	.224007	72.55	.224736	72.67
20	6.918618	103.03	6.918979	103.10	20	7.228360	72.18	7.229095	72.30
21	.924800	102.28	.925165	102.38	21	.232691	71.82	.233433	71.95
22	.930937	101.58	.931308	101.67	22	.237000	71.47	.237750	71.60
23	.937032	100.87	.937408	100.95	23	.241288	71.12	.242046	71.23
24	.943084	100.17	.943465	100.25	24	.245555	70.77	.246320	70.90
25	6.949094	99.48	6.949480	99.57	25	7.249801	70.43	7.250574	70.55
26	.955063	98.80	.955454	98.90	26	.254027	70.08	.254807	70.20
27	.960991	98.13	.961388	98.22	27	.258232	69.73	.259019	69.88
28	.966879	97.47	.967281	97.57	28	.262416	69.42	.263212	69.53
29	.972727	96.82	.973135	96.90	29	.266581	69.08	.267384	69.22
30	6.978536	96.17	6.978949	96.27	30	7.270726	68.75	7.271537	68.87
31	.984306	95.55	.984725	95.63	31	.274851	68.42	.275669	68.57
32	.990039	94.90	.990463	95.02	32	.278956	68.12	.279783	68.23
33	.995733	94.30	.996164	94.38	33	.283043	67.78	.283877	67.92
34	7.001391	93.68	7.001827	93.78	34	.287110	67.47	.287952	67.58
35	7.007012	93.08	7.007454	93.17	35	7.291158	67.15	7.292007	67.30
36	.012597	92.48	.013044	92.58	36	.295187	66.83	.296045	66.97
37	.018146	91.90	.018599	92.00	37	.299197	66.55	.300063	66.67
38	.023660	91.32	.024119	91.42	38	.303190	66.23	.304063	66.37
39	.029139	90.75	.029604	90.83	39	.307164	65.92	.308045	66.07
40	7.034584	90.18	7.035054	90.28	40	7.311119	65.63	7.312009	65.77
41	.039995	89.62	.040471	89.72	41	.315057	65.33	.315955	65.47
42	.045372	89.07	.045854	89.17	42	.318977	65.05	.319883	65.18
43	.050716	88.53	.051204	88.63	43	.322880	64.75	.323794	64.88
44	.056028	87.98	.056522	88.08	44	.326765	64.45	.327687	64.60
45	7.061307	87.45	7.061807	87.57	45	7.330632	64.18	7.331563	64.32
46	.066554	86.93	.067061	87.02	46	.334483	63.88	.335422	64.03
47	.071770	86.40	.072282	86.52	47	.338316	63.62	.339264	63.75
48	.076954	85.90	.077473	86.00	48	.342133	63.33	.343089	63.47
49	.082108	85.40	.082633	85.50	49	.345933	63.05	.346897	63.20
50	7.087232	84.88	7.087763	84.98	50	7.349716	62.78	7.350689	62.92
51	.092325	84.40	.092862	84.50	51	.353483	62.50	.354464	62.65
52	.097389	83.90	.097932	84.02	52	.357233	62.25	.358223	62.38
53	.102423	83.42	.102973	83.53	53	.360968	61.97	.361966	62.12
54	.107428	82.95	.107985	83.05	54	.364686	61.72	.365693	61.85
55	7.112405	82.47	7.112968	82.57	55	7.368389	61.45	7.369404	61.60
56	.117353	82.00	.117922	82.12	56	.372076	61.18	.373100	61.33
57	.122273	81.53	.122849	81.65	57	.375747	60.93	.376780	61.07
58	.127165	81.08	.127748	81.18	58	.379403	60.67	.380444	60.83
59	.132030	80.63	.132619	80.75	59	.383043	60.42	.384094	60.57
60	7.136868		7.137464		60	7.386668		7.387728	

TABLE XV.—LOGARITHMIC VERSED SINES

4°					5°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	7.386668	60.17	7.387728	60.32	0	7.580389	48.15	7.582045	48.33
1	.390278	59.93	.391347	60.07	1	.583278	47.98	.584945	48.17
2	.393874	59.67	.394951	59.82	2	.586157	47.82	.587835	48.00
3	.397454	59.43	.398540	59.57	3	.589026	47.67	.590715	47.87
4	.401020	59.18	.402114	59.33	4	.591886	47.52	.593587	47.70
5	7.404571	58.93	7.405674	59.10	5	7.594737	47.35	7.596449	47.53
6	.408107	58.70	.409220	58.85	6	.597578	47.20	.599301	47.38
7	.411629	58.47	.412751	58.62	7	.600410	47.05	.602144	47.25
8	.415137	58.23	.416268	58.38	8	.603233	46.90	.604979	47.08
9	.418631	58.00	.419771	58.15	9	.606047	46.73	.607804	46.92
10	7.422111	57.77	7.423260	57.92	10	7.608851	46.60	7.610619	46.78
11	.425577	57.53	.426735	57.70	11	.611647	46.43	.613426	46.63
12	.429029	57.30	.430197	57.45	12	.614433	46.30	.616224	46.48
13	.432467	57.08	.433644	57.25	13	.617211	46.15	.619013	46.35
14	.435892	56.85	.437079	57.00	14	.619980	45.98	.621794	46.18
15	7.439303	56.63	7.440499	56.80	15	7.622739	45.87	7.624565	46.05
16	.442701	56.42	.443907	56.57	16	.625491	45.70	.627328	45.90
17	.446086	56.20	.447301	56.35	17	.628233	45.57	.630082	45.75
18	.449458	55.97	.450682	56.13	18	.630967	45.42	.632827	45.62
19	.452816	55.77	.454050	55.92	19	.633692	45.28	.635564	45.48
20	7.456162	55.55	7.457405	55.72	20	7.636409	45.13	7.638293	45.33
21	.459495	55.33	.460748	55.48	21	.639117	44.98	.641013	45.18
22	.462815	55.12	.464077	55.28	22	.641816	44.87	.643724	45.07
23	.466122	54.92	.467394	55.08	23	.644508	44.72	.646428	44.90
24	.469417	54.70	.470699	54.87	24	.647191	44.57	.649122	44.78
25	7.472699	54.50	7.473991	54.65	25	7.649865	44.45	7.651809	44.65
26	.475969	54.28	.477270	54.47	26	.652532	44.30	.654488	44.50
27	.479226	54.10	.480538	54.25	27	.655190	44.17	.657158	44.37
28	.482472	53.88	.483793	54.05	28	.657840	44.05	.659820	44.23
29	.485705	53.70	.487036	53.85	29	.660483	43.90	.662474	44.12
30	7.488927	53.48	7.490267	53.67	30	7.663117	43.77	7.665121	43.97
31	.492136	53.28	.493487	53.45	31	.665743	43.63	.667759	43.83
32	.495333	53.10	.496694	53.27	32	.668361	43.50	.670389	43.72
33	.498519	52.90	.499890	53.07	33	.670971	43.38	.673012	43.57
34	.501693	52.72	.503074	52.88	34	.673574	43.23	.675626	43.45
35	7.504856	52.52	7.506247	52.68	35	7.676168	43.12	7.678233	43.33
36	.508007	52.33	.509408	52.50	36	.678755	42.98	.680833	43.18
37	.511147	52.13	.512558	52.32	37	.681334	42.87	.683424	43.07
38	.514275	51.95	.515697	52.12	38	.683906	42.73	.686008	42.95
39	.517392	51.77	.518824	51.93	39	.686470	42.60	.688585	42.82
40	7.520498	51.58	7.521940	51.77	40	7.689026	42.48	7.691154	42.68
41	.523593	51.40	.525046	51.57	41	.691575	42.35	.693715	42.57
42	.526677	51.22	.528140	51.38	42	.694116	42.23	.696269	42.43
43	.529750	51.03	.531223	51.22	43	.696650	42.12	.698815	42.33
44	.532812	50.85	.534296	51.02	44	.699177	41.98	.701355	42.20
45	7.535863	50.68	7.537357	50.85	45	7.701696	41.87	7.703887	42.07
46	.538904	50.50	.540408	50.68	46	.704208	41.73	.706411	41.97
47	.541934	50.32	.543449	50.50	47	.706712	41.63	.708929	41.83
48	.544953	50.15	.546479	50.33	48	.709210	41.50	.711439	41.72
49	.547962	49.98	.549499	50.15	49	.711700	41.38	.713942	41.60
50	7.550961	49.80	7.552508	49.98	50	7.714183	41.27	7.716438	41.48
51	.553949	49.63	.555507	49.80	51	.716659	41.15	.718927	41.37
52	.556927	49.47	.558495	49.65	52	.719128	41.03	.721409	41.25
53	.559895	49.28	.561474	49.47	53	.721590	40.92	.723884	41.13
54	.562852	49.13	.564442	49.32	54	.724045	40.80	.726352	41.02
55	7.565800	48.95	7.567401	49.13	55	7.726493	40.68	7.728813	40.90
56	.568737	48.80	.570349	48.98	56	.728934	40.57	.731267	40.78
57	.571665	48.63	.573288	48.82	57	.731368	40.47	.733714	40.68
58	.574583	48.47	.576217	48.65	58	.733796	40.33	.736155	40.57
59	.577491	48.30	.579136	48.48	59	.736216	40.23	.738589	40.45
60	7.580389		7.582045		60	7.738630		7.741016	

6°					7°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	7.738630	40.13	7.741016	40.33	0	7.872381	34.38	7.875630	34.63
1	.741038	40.00	.743436	40.23	1	.874444	34.30	.877708	34.57
2	.743438	39.90	.745850	40.13	2	.876502	34.22	.879782	34.48
3	.745832	39.78	.748258	40.00	3	.878555	34.13	.881851	34.40
4	.748219	39.68	.750658	39.90	4	.880603	34.07	.883915	34.32
5	7.750600	39.57	7.753052	39.80	5	7.882647	33.98	7.885974	34.25
6	.752974	39.47	.755440	39.68	6	.884686	33.90	.888029	34.15
7	.755342	39.35	.757821	39.58	7	.886720	33.82	.890078	34.08
8	.757703	39.25	.760196	39.48	8	.888749	33.73	.892123	34.02
9	.760058	39.13	.762565	39.37	9	.890773	33.67	.894164	33.92
10	7.762406	39.05	7.764927	39.25	10	7.892793	33.58	7.896199	33.85
11	.764749	38.92	.767282	39.17	11	.894808	33.50	.898230	33.77
12	.767084	38.83	.769632	39.05	12	.896818	33.43	.900256	33.70
13	.769414	38.72	.771975	38.95	13	.898824	33.35	.902278	33.62
14	.771737	38.62	.774312	38.85	14	.900825	33.27	.904295	33.53
15	7.774054	38.52	7.776643	38.75	15	7.902821	33.20	7.906307	33.47
16	.776365	38.42	.778968	38.63	16	.904813	33.12	.908315	33.40
17	.778670	38.30	.781286	38.55	17	.906800	33.05	.910319	33.30
18	.780968	38.22	.783599	38.43	18	.908783	32.97	.912317	33.25
19	.783261	38.10	.785905	38.35	19	.910761	32.90	.914312	33.17
20	7.785547	38.02	7.788206	38.23	20	7.912735	32.82	7.916302	33.08
21	.787828	37.90	.790500	38.15	21	.914704	32.73	.918287	33.02
22	.790102	37.82	.792789	38.03	22	.916668	32.68	.920268	32.95
23	.792371	37.70	.795071	37.95	23	.918629	32.58	.922245	32.87
24	.794633	37.62	.797348	37.85	24	.920584	32.53	.924217	32.78
25	7.796890	37.52	7.799619	37.75	25	7.922536	32.45	7.926184	32.73
26	.799141	37.40	.801884	37.65	26	.924483	32.37	.928148	32.65
27	.801385	37.33	.804143	37.57	27	.926425	32.32	.930107	32.58
28	.803625	37.22	.806397	37.45	28	.928364	32.22	.932062	32.50
29	.805858	37.13	.808644	37.37	29	.930297	32.17	.934012	32.43
30	7.808086	37.03	7.810886	37.28	30	7.932227	32.08	7.935958	32.37
31	.810308	36.93	.813123	37.17	31	.934152	32.02	.937900	32.30
32	.812524	36.83	.815353	37.08	32	.936073	31.95	.939838	32.23
33	.814734	36.75	.817578	37.00	33	.937990	31.88	.941772	32.15
34	.816939	36.67	.819798	36.90	34	.939903	31.80	.943701	32.08
35	7.819139	36.55	7.822012	36.80	35	7.941811	31.73	7.945626	32.02
36	.821332	36.48	.824220	36.72	36	.943715	31.67	.947547	31.95
37	.823521	36.37	.826423	36.62	37	.945615	31.60	.949464	31.87
38	.825703	36.28	.828620	36.53	38	.947511	31.52	.951376	31.82
39	.827880	36.20	.830812	36.45	39	.949402	31.47	.953285	31.73
40	7.830052	36.10	7.832999	36.35	40	7.951290	31.38	7.955189	31.68
41	.832218	36.02	.835180	36.27	41	.953173	31.32	.957090	31.60
42	.834379	35.93	.837356	36.17	42	.955052	31.27	.958986	31.53
43	.836535	35.83	.839526	36.08	43	.956928	31.18	.960878	31.48
44	.838685	35.75	.841691	36.00	44	.958799	31.12	.962767	31.40
45	7.840830	35.65	7.843851	35.90	45	7.960666	31.05	7.964651	31.33
46	.842969	35.58	.846005	35.83	46	.962529	30.98	.966531	31.28
47	.845104	35.48	.848155	35.73	47	.964388	30.92	.968408	31.20
48	.847233	35.40	.850299	35.63	48	.966243	30.85	.970280	31.13
49	.849357	35.30	.852437	35.57	49	.968094	30.78	.972148	31.08
50	7.851475	35.23	7.854571	35.48	50	7.969941	30.73	7.974013	31.02
51	.853589	35.13	.856700	35.38	51	.971785	30.65	.975874	30.93
52	.855697	35.05	.858823	35.32	52	.973624	30.58	.977730	30.88
53	.857800	34.97	.860942	35.22	53	.975459	30.53	.979583	30.82
54	.859898	34.88	.863055	35.13	54	.977291	30.45	.981432	30.75
55	7.861991	34.80	7.865163	35.05	55	7.979118	30.40	7.983277	30.70
56	.864079	34.72	.867266	34.98	56	.980942	30.33	.985119	30.62
57	.866162	34.63	.869365	34.88	57	.982762	30.27	.986956	30.57
58	.868240	34.55	.871458	34.80	58	.984578	30.22	.988790	30.50
59	.870313	34.47	.873546	34.73	59	.986391	30.13	.990620	30.43
60	7.872381		7.875630		60	7.988199		7.992446	

TABLE XV.—LOGARITHMIC VERSED SINES

8°					9°				
M.	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**	**M.**	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**
0	7.988199	30.08	7.992446	30.38	0	8.090317	26.72	8.095697	27.05
1	.990004	30.02	.994269	30.32	1	.091920	26.68	.097320	27.02
2	.991805	29.95	.996088	30.25	2	.093521	26.63	.098941	26.97
3	.993602	29.88	.997903	30.18	3	.095119	26.58	.100559	26.92
4	.995395	29.83	.999714	30.13	4	.096714	26.52	.102174	26.87
5	7.997185	29.77	8.001522	30.07	5	8.098305	26.48	8.103786	26.82
6	.998971	29.72	.003326	30.00	6	.099894	26.43	.105395	26.77
7	8.000754	29.63	.005126	29.95	7	.101480	26.40	.107001	26.73
8	.002532	29.60	.006923	29.88	8	.103064	26.33	.108605	26.67
9	.004308	29.52	.008716	29.83	9	.104644	26.28	.110205	26.63
10	8.006079	29.47	8.010506	29.77	10	8.106221	26.25	8.111803	26.58
11	.007847	29.40	.012292	29.70	11	.107796	26.18	.113398	20.53
12	.009611	29.35	.014074	29.65	12	.109367	26.15	.114990	20.48
13	.011372	29.28	.015853	29.58	13	.110936	26.10	.116579	26.45
14	.013129	29.22	.017628	29.53	14	.112502	26.05	.118166	26.38
15	8.014882	29.17	8.019400	29.47	15	8.114065	26.00	8.119749	26.35
16	.016632	29.10	.021168	29.42	16	.115625	25.95	.121330	26.30
17	.018378	29.05	.022933	29.35	17	.117182	25.92	.122908	26.25
18	.020121	29.00	.024694	29.30	18	.118737	25.87	.124483	26.22
19	.021861	28.93	.026452	29.23	19	.120289	25.82	.126056	26.17
20	8.023597	28.87	8.028206	29.18	20	8.121838	25.77	8.127626	26.12
21	.025329	28.82	.029957	29.13	21	.123384	25.72	.129193	26.07
22	.027058	28.75	.031705	29.07	22	.124927	25.68	.130757	26.02
23	.028783	28.70	.033449	29.00	23	.126468	25.63	.132318	25.98
24	.030505	28.65	.035189	28.97	24	.128006	25.58	.133877	25.93
25	8.032224	28.58	8.036927	28.90	25	8.129541	25.55	8.135433	25.90
26	.033939	28.53	.038661	28.83	26	.131074	25.50	.136987	25.85
27	.035651	28.47	.040391	28.78	27	.132604	25.45	.138538	25.80
28	.037359	28.42	.042118	28.73	28	.134131	25.40	.140086	25.75
29	.039064	28.37	.043842	28.68	29	.135655	25.37	.141631	25.72
30	8.040766	28.30	8.045563	28.62	30	8.137177	25.32	8.143174	25.67
31	.042464	28.25	.047280	28.57	31	.138696	25.27	.144714	25.63
32	.044159	28.20	.048994	28.50	32	.140212	25.23	.146252	25.58
33	.045851	28.13	.050704	28.47	33	.141726	25.18	.147787	25.53
34	.047539	28.08	.052412	28.40	34	.143237	25.13	.149319	25.50
35	8.049224	28.03	8.054116	28.35	35	8.144745	25.10	8.150849	25.45
36	.050906	27.98	.055817	28.28	36	.146251	25.05	.152376	25.40
37	.052585	27.92	.057514	28.25	37	.147754	25.02	.153900	25.37
38	.054260	27.87	.059209	28.18	38	.149255	24.95	.155422	25.33
39	.055932	27.82	.060900	28.13	39	.150752	24.93	.156942	25.27
40	8.057601	27.75	8.062588	28.08	40	8.152248	24.88	8.158458	25.25
41	.059266	27.72	.064273	28.03	41	.153741	24.83	.159973	25.18
42	.060929	27.65	.065955	27.97	42	.155231	24.78	.161484	25.17
43	.062588	27.60	.067633	27.93	43	.156718	24.75	.162994	25.10
44	.064244	27.55	.069309	27.87	44	.158203	24.72	.164500	25.07
45	8.065897	27.48	8.070981	27.82	45	8.159686	24.67	8.166004	25.03
46	.067546	27.45	.072650	27.77	46	.161166	24.62	.167506	24.98
47	.069193	27.38	.074316	27.72	47	.162643	24.58	.169005	24.95
48	.070836	27.33	.075979	27.67	48	.164118	24.53	.170502	24.90
49	.072476	27.30	.077639	27.60	49	.165590	24.50	.171996	24.87
50	8.074114	27.23	8.079295	27.57	50	8.167060	24.45	8.173488	24.82
51	.075748	27.18	.080949	27.52	51	.168527	24.42	.174977	24.78
52	.077379	27.13	.082600	27.45	52	.169992	24.37	.176464	24.73
53	.079007	27.07	.084247	27.42	53	.171454	24.33	.177948	24.70
54	.080631	27.03	.085892	27.37	54	.172914	24.30	.179430	24.65
55	8.082253	26.98	8.087534	27.30	55	8.174372	24.25	8.180909	24.62
56	.083872	26.93	.089172	27.27	56	.175827	24.20	.182386	24.58
57	.085488	26.87	.090808	27.20	57	.177279	24.17	.183861	24.53
58	.087100	26.83	.092440	27.17	58	.178729	24.13	.185333	24.50
59	.088710	26.78	.094070	27.12	59	.180177	24.08	.186803	24.47
60	8.090317		8.095697		60	8.181622		8.188271	

10°					11°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	8.181622	24.05	8.188271	24.42	0	8.264176	21.85	8.272229	22.27
1	.183065	24.00	.189736	24.37	1	.265487	21.82	.273565	22.22
2	.184505	23.97	.191198	24.35	2	.266796	21.78	.274898	22.20
3	.185943	23.93	.192659	24.30	3	.268103	21.75	.276230	22.17
4	.187379	23.88	.194117	24.25	4	.269408	21.72	.277560	22.13
5	8.188812	23.85	8.195572	24.22	5	8.270711	21.68	8.278888	22.08
6	.190243	23.80	.197025	24.18	6	.272012	21.65	.280213	22.07
7	.191671	23.77	.198476	24.15	7	.273311	21.62	.281537	22.03
8	.193097	23.73	.199925	24.10	8	.274608	21.58	.282859	22.00
9	.194521	23.68	.201371	24.07	9	.275903	21.57	.284179	21.98
10	8.195942	23.65	8.202815	24.03	10	8.277197	21.52	8.285498	21.93
11	.197361	23.62	.204257	23.98	11	.278488	21.48	.286814	21.90
12	.198778	23.57	.205696	23.95	12	.279777	21.47	.288128	21.88
13	.200192	23.53	.207133	23.92	13	.281065	21.42	.289441	21.83
14	.201604	23.50	.208568	23.88	14	.282350	21.40	.290751	21.82
15	8.203014	23.45	8.210001	23.83	15	8.283634	21.37	8.292060	21.78
16	.204421	23.42	.211431	23.80	16	.284916	21.33	.293367	21.75
17	.205826	23.38	.212859	23.77	17	.286196	21.28	.294672	21.72
18	.207229	23.35	.214285	23.72	18	.287473	21.27	.295975	21.68
19	.208630	23.30	.215708	23.70	19	.288749	21.25	.297276	21.67
20	8.210028	23.27	8.217130	23.65	20	8.290024	21.20	8.298576	21.62
21	.211424	23.23	.218549	23.62	21	.291296	21.17	.299873	21.60
22	.212818	23.18	.219966	23.57	22	.292566	21.15	.301169	21.57
23	.214209	23.17	.221380	23.55	23	.293835	21.10	.302463	21.53
24	.215599	23.12	.222793	23.50	24	.295101	21.08	.303755	21.50
25	8.216986	23.08	8.224203	23.47	25	8.296366	21.05	8.305045	21.48
26	.218371	23.03	.225611	23.43	26	.297629	21.02	.306334	21.43
27	.219753	23.00	.227017	23.40	27	.298890	20.98	.307620	21.42
28	.221133	22.98	.228421	23.35	28	.300149	20.95	.308905	21.38
29	.222512	22.93	.229822	23.32	29	.301406	20.93	.310188	21.35
30	8.223888	22.88	8.231221	23.30	30	8.302662	20.90	8.311469	21.33
31	.225261	22.87	.232619	23.25	31	.303916	20.85	.312749	21.28
32	.226633	22.82	.234014	23.22	32	.305167	20.85	.314026	21.27
33	.228002	22.78	.235407	23.17	33	.306418	20.80	.315302	21.23
34	.229369	22.77	.236797	23.15	34	.307666	20.77	.316576	21.20
35	8.230735	22.70	8.238186	23.10	35	8.308912	20.75	8.317848	21.18
36	.232097	22.68	.239572	23.08	36	.310157	20.72	.319119	21.15
37	.233458	22.65	.240957	23.03	37	.311400	20.68	.320388	21.12
38	.234817	22.60	.242339	23.00	38	.312641	20.65	.321655	21.08
39	.236173	22.57	.243719	22.97	39	.313880	20.62	.322920	21.05
40	8.237527	22.55	8.245097	22.93	40	8.315117	20.60	8.324183	21.03
41	.238880	22.50	.246473	22.90	41	.316353	20.57	.325445	21.00
42	.240230	22.47	.247847	22.87	42	.317587	20.53	.326705	20.98
43	.241578	22.43	.249219	22.83	43	.318819	20.50	.327964	20.93
44	.242924	22.38	.250589	22.80	44	.320049	20.48	.329220	20.92
45	8.244267	22.37	8.251957	22.75	45	8.321278	20.45	8.330475	20.88
46	.245609	22.32	.253322	22.73	46	.322505	20.42	.331728	20.87
47	.246948	22.30	.254686	22.68	47	.323730	20.38	.332980	20.82
48	.248286	22.25	.256047	22.67	48	.324953	20.37	.334229	20.80
49	.249621	22.23	.257407	22.62	49	.326175	20.33	.335477	20.78
50	8.250955	22.18	8.258764	22.60	50	8.327395	20.30	8.336724	20.73
51	.252286	22.15	.260120	22.55	51	.328613	20.27	.337968	20.72
52	.253615	22.12	.261473	22.53	52	.329829	20.25	.339211	20.70
53	.254942	22.10	.262825	22.48	53	.331044	20.22	.340453	20.65
54	.256268	22.05	.264174	22.47	54	.332257	20.18	.341692	20.63
55	8.257591	22.02	8.265522	22.42	55	8.333468	20.17	8.342930	20.60
56	.258912	21.98	.266867	22.40	56	.334678	20.13	.344166	20.58
57	.260231	21.95	.268211	22.35	57	.335886	20.10	.345401	20.55
58	.261548	21.92	.269552	22.33	58	.337092	20.07	.346634	20.52
59	.262863	21.88	.270892	22.28	59	.338296	20.05	.347865	20.50
60	8.264176		8.272229		60	8.339499		8.349095	

TABLE XV.—LOGARITHMIC VERSED SINES

12°					13°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	8.339499	20.02	8.349095	20.47	0	8.408748	18.47	8.420024	18.95
1	.340700	20.00	.350323	20.43	1	.409856	18.43	.421161	18.93
2	.341900	19.95	.351549	20.42	2	.410962	18.42	.422297	18.90
3	.343097	19.95	.352774	20.38	3	.412067	18.40	.423431	18.88
4	.344294	19.90	.353997	20.35	4	.413171	18.38	.424564	18.87
5	8.345488	19.88	8.355218	20.33	5	8.414274	18.35	8.425696	18.83
6	.346681	19.85	.356438	20.30	6	.415375	18.32	.426826	18.82
7	.347872	19.82	.357656	20.28	7	.416474	18.30	.427955	18.80
8	.349061	19.80	.358873	20.25	8	.417572	18.28	.429083	18.77
9	.350249	19.77	.360088	20.22	9	.418669	18.25	.430209	18.75
10	8.351435	19.75	8.361301	20.20	10	8.419764	18.23	8.431334	18.73
11	.352620	19.72	.362513	20.18	11	.420858	18.22	.432458	18.70
12	.353803	19.68	.363724	20.13	12	.421951	18.18	.433580	18.67
13	.354984	19.67	.364932	20.12	13	.423042	18.17	.434700	18.67
14	.356164	19.63	.366139	20.10	14	.424132	18.13	.435820	18.63
15	8.357342	19.60	8.367345	20.07	15	8.425220	18.12	8.436938	18.62
16	.358518	19.58	.368549	20.03	16	.426307	18.10	.438055	18.58
17	.359693	19.55	.369751	20.02	17	.427393	18.07	.439170	18.57
18	.360866	19.53	.370952	19.98	18	.428477	18.05	.440284	18.55
19	.362038	19.50	.372151	19.95	19	.429560	18.02	.441397	18.53
20	8.363208	19.48	8.373348	19.95	20	8.430641	18.02	8.442509	18.50
21	.364377	19.43	.374545	19.90	21	.431722	17.97	.443619	18.47
22	.365543	19.43	.375739	19.88	22	.432800	17.97	.444727	18.47
23	.366709	19.38	.376932	19.85	23	.433878	17.93	.445835	18.43
24	.367872	19.37	.378123	19.83	24	.434954	17.92	.446941	18.42
25	8.369034	19.35	8.379313	19.82	25	8.436029	17.88	8.448046	18.38
26	.370195	19.32	.380502	19.78	26	.437102	17.87	.449149	18.38
27	.371354	19.28	.381689	19.75	27	.438174	17.85	.450252	18.35
28	.372511	19.27	.382874	19.73	28	.439245	17.82	.451353	18.32
29	.373667	19.25	.384058	19.70	29	.440314	17.80	.452452	18.32
30	8.374822	19.20	8.385240	19.68	30	8.441382	17.78	8.453551	18.28
31	.375974	19.18	.386421	19.65	31	.442449	17.75	.454648	18.25
32	.377125	19.17	.387600	19.63	32	.443514	17.73	.455743	18.25
33	.378275	19.13	.388778	19.60	33	.444578	17.72	.456838	18.22
34	.379423	19.12	.389954	19.58	34	.445641	17.68	.457931	18.20
35	8.380570	19.08	8.391129	19.55	35	8.446702	17.68	8.459023	18.18
36	.381715	19.05	.392302	19.53	36	.447763	17.63	.460114	18.15
37	.382858	19.03	.393474	19.50	37	.448821	17.63	.461203	18.13
38	.384000	19.02	.394644	19.48	38	.449879	17.60	.462291	18.12
39	.385141	18.98	.395813	19.45	39	.450935	17.58	.463378	18.10
40	8.386280	18.95	8.396980	19.43	40	8.451990	17.55	8.464464	18.07
41	.387417	18.93	.398146	19.42	41	.453043	17.55	.465548	18.05
42	.388553	18.92	.399311	19.38	42	.454096	17.52	.466631	18.03
43	.389688	18.88	.400474	19.35	43	.455147	17.48	.467713	18.00
44	.390821	18.85	.401635	19.33	44	.456196	17.48	.468793	18.00
45	8.391952	18.83	8.402795	19.32	45	8.457245	17.45	8.469873	17.97
46	.393082	18.82	.403954	19.28	46	.458292	17.43	.470951	17.95
47	.394211	18.78	.405111	19.27	47	.459338	17.40	.472028	17.92
48	.395338	18.75	.406267	19.23	48	.460382	17.40	.473103	17.90
49	.396463	18.73	.407421	19.22	49	.461426	17.37	.474177	17.90
50	8.397587	18.72	8.408574	19.18	50	8.462468	17.35	8.475251	17.85
51	.398710	18.68	.409725	19.17	51	.463509	17.32	.476322	17.85
52	.399831	18.67	.410875	19.13	52	.464548	17.30	.477393	17.83
53	.400951	18.63	.412023	19.13	53	.465586	17.28	.478463	17.80
54	.402069	18.62	.413171	19.08	54	.466623	17.27	.479531	17.78
55	8.403186	18.58	8.414316	19.08	55	8.467659	17.23	8.480598	17.77
56	.404301	18.57	.415461	19.03	56	.468693	17.23	.481664	17.73
57	.405415	18.53	.416603	19.03	57	.469727	17.20	.482728	17.73
58	.406527	18.52	.417745	19.00	58	.470759	17.17	.483792	17.70
59	.407638	18.50	.418885	18.98	59	.471789	17.17	.484854	17.68
60	8.408748		8.420024		60	8.472819		8.485915	

14°					15°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	8.472819	17.13	8.485915	17.67	0	8.532425	15.98	8.547482	16.53
1	.473847	17.12	.486975	17.63	1	.533384	15.97	.548474	16.53
2	.474874	17.10	.488033	17.63	2	.534342	15.95	.549466	16.52
3	.475900	17.08	.489091	17.60	3	.535299	15.93	.550457	16.50
4	.476925	17.05	.490147	17.58	4	.536255	15.92	.551447	16.48
5	8.477948	17.03	8.491202	17.57	5	8.537210	15.88	8.552436	16.47
6	.478970	17.02	.492256	17.53	6	.538163	15.88	.553424	16.43
7	.479991	17.00	.493308	17.53	7	.539116	15.87	.554410	16.43
8	.481011	16.97	.494360	17.50	8	.540068	15.83	.555396	16.42
9	.482029	16.95	.495410	17.48	9	.541018	15.83	.556381	16.38
10	8.483046	16.93	8.496459	17.47	10	8.541968	15.80	8.557364	16.38
11	.484062	16.92	.497507	17.45	11	.542916	15.78	.558347	16.37
12	.485077	16.90	.498554	17.43	12	.543863	15.78	.559329	16.33
13	.486091	16.87	.499600	17.40	13	.544810	15.75	.560309	16.33
14	.487103	16.87	.500644	17.38	14	.545755	15.73	.561289	16.30
15	8.488115	16.83	8.501687	17.38	15	8.546699	15.72	8.562267	16.30
16	.489125	16.82	.502730	17.35	16	.547642	15.70	.563245	16.28
17	.490134	16.78	.503771	17.32	17	.548584	15.68	.564222	16.25
18	.491141	16.78	.504810	17.32	18	.549525	15.67	.565197	16.25
19	.492148	16.75	.505849	17.30	19	.550465	15.65	.566172	16.22
20	8.493153	16.73	8.506887	17.27	20	8.551404	15.63	8.567145	16.22
21	.494157	16.72	.507923	17.25	21	.552342	15.62	.568118	16.20
22	.495160	16.70	.508958	17.25	22	.553279	15.60	.569090	16.17
23	.496162	16.67	.509993	17.22	23	.554215	15.58	.570060	16.17
24	.497162	16.67	.511026	17.18	24	.555150	15.57	.571030	16.15
25	8.498162	16.63	8.512057	17.18	25	8.556084	15.55	8.571999	16.12
26	.499160	16.62	.513088	17.17	26	.557017	15.53	.572966	16.12
27	.500157	16.60	.514118	17.13	27	.557949	15.50	.573933	16.10
28	.501153	16.58	.515146	17.13	28	.558879	15.50	.574899	16.08
29	.502148	16.57	.516174	17.10	29	.559809	15.48	.575864	16.05
30	8.503142	16.53	8.517200	17.08	30	8.560738	15.47	8.576827	16.05
31	.504134	16.52	.518225	17.07	31	.561666	15.43	.577790	16.03
32	.505125	16.52	.519249	17.05	32	.562592	15.43	.578752	16.02
33	.506116	16.48	.520272	17.03	33	.563518	15.42	.579713	16.00
34	.507105	16.45	.521294	17.02	34	.564443	15.40	.580673	15.98
35	8.508092	16.45	8.522315	16.98	35	8.565367	15.37	8.581632	15.97
36	.509079	16.43	.523334	16.98	36	.566289	15.37	.582590	15.95
37	.510065	16.40	.524353	16.95	37	.567211	15.35	.583547	15.93
38	.511049	16.40	.525370	16.95	38	.568132	15.33	.584503	15.92
39	.512033	16.37	.526387	16.92	39	.569052	15.30	.585458	15.90
40	8.513015	16.35	8.527402	16.90	40	8.569970	15.30	8.586412	15.88
41	.513996	16.33	.528416	16.88	41	.570888	15.28	.587365	15.88
42	.514976	16.32	.529429	16.87	42	.571805	15.27	.588318	15.85
43	.515955	16.28	.530441	16.85	43	.572721	15.25	.589269	15.83
44	.516932	16.28	.531452	16.83	44	.573636	15.22	.590219	15.83
45	8.517909	16.25	8.532462	16.82	45	8.574549	15.22	8.591169	15.80
46	.518884	16.25	.533471	16.78	46	.575462	15.20	.592117	15.80
47	.519859	16.22	.534478	16.78	47	.576374	15.18	.593065	15.78
48	.520832	16.20	.535485	16.75	48	.577285	15.17	.594012	15.75
49	.521804	16.18	.536490	16.75	49	.578195	15.15	.594957	15.75
50	8.522775	16.17	8.537495	16.72	50	8.579104	15.13	8.595902	15.73
51	.523745	16.15	.538498	16.72	51	.580012	15.12	.596846	15.72
52	.524714	16.13	.539501	16.68	52	.580919	15.10	.597789	15.70
53	.525682	16.10	.540502	16.67	53	.581825	15.08	.598731	15.68
54	.526648	16.10	.541502	16.65	54	.582730	15.07	.599672	15.67
55	8.527614	16.07	8.542501	16.63	55	8.583634	15.05	8.600612	15.65
56	.528578	16.07	.543499	16.63	56	.584537	15.05	.601551	15.65
57	.529542	16.03	.544497	16.60	57	.585440	15.02	.602490	15.62
58	.530504	16.02	.545493	16.58	58	.586341	15.00	.603427	15.60
59	.531465	16.00	.546488	16.57	59	.587241	15.00	.604363	15.60
60	8.532425		8.547482		60	8.588141		8.605299	

TABLE XV.—LOGARITHMIC VERSED SINES

	16°					17°			
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	8.588141	14.97	8.605299	15.58	0	8.640434	14.08	8.659838	14.72
1	.589039	14.95	.606234	15.55	1	.641279	14.07	.660721	14.72
2	.589936	14.95	.607167	15.55	2	.642123	14.05	.661604	14.70
3	.590833	14.93	.608100	15.53	3	.642966	14.05	.662486	14.68
4	.591729	14.90	.609032	15.52	4	.643809	14.02	.663367	14.68
5	8.592623	14.90	8.609963	15.50	5	8.644650	14.02	8.664248	14.65
6	.593517	14.88	.610893	15.50	6	.645491	14.00	.665127	14.65
7	.594410	14.87	.611823	15.47	7	.646331	13.98	.666006	14.63
8	.595302	14.83	.612751	15.45	8	.647170	13.97	.666884	14.62
9	.596192	14.83	.613678	15.45	9	.648008	13.95	.667761	14.60
10	8.597082	14.82	8.614605	15.43	10	8.648845	13.95	8.668637	14.60
11	.597971	14.82	.615531	15.42	11	.649682	13.93	.669513	14.58
12	.598860	14.78	.616456	15.38	12	.650518	13.92	.670388	14.57
13	.599747	14.77	.617379	15.38	13	.651353	13.90	.671262	14.55
14	.600633	14.75	.618302	15.38	14	.652187	13.88	.672135	14.55
15	8.601518	14.75	8.619225	15.35	15	8.653020	13.87	8.673008	14.52
16	.602403	14.72	.620146	15.33	16	.653852	13.87	.673879	14.52
17	.603286	14.72	.621066	15.33	17	.654684	13.85	.674750	14.50
18	.604169	14.70	.621986	15.30	18	.655515	13.83	.675620	14.50
19	.605051	14.67	.622904	15.30	19	.656345	13.82	.676490	14.47
20	8.605931	14.67	8.623822	15.28	20	8.657174	13.82	8.677358	14.47
21	.606811	14.65	.624739	15.27	21	.658003	13.78	.678226	14.45
22	.607690	14.63	.625655	15.25	22	.658830	13.78	.679093	14.45
23	.608568	14.62	.626570	15.23	23	.659657	13.77	.679960	14.42
24	.609445	14.60	.627484	15.23	24	.660483	13.75	.680825	14.42
25	8.610321	14.60	8.628398	15.20	25	8.661308	13.73	8.681690	14.40
26	.611197	14.57	.629310	15.20	26	.662132	13.73	.682554	14.38
27	.612071	14.57	.630222	15.18	27	.662956	13.72	.683417	14.38
28	.612945	14.53	.631133	15.17	28	.663779	13.70	.684280	14.35
29	.613817	14.53	.632043	15.15	29	.664601	13.68	.685141	14.35
30	8.614689	14.52	8.632952	15.13	30	8.665422	13.67	8.686002	14.35
31	.615560	14.50	.633860	15.13	31	.666242	13.67	.686863	14.32
32	.616430	14.48	.634768	15.10	32	.667062	13.65	.687722	14.32
33	.617299	14.47	.635674	15.10	33	.667881	13.63	.688581	14.30
34	.618167	14.45	.636580	15.08	34	.668699	13.62	.689439	14.28
35	8.619034	14.45	8.637485	15.07	35	8.669516	13.60	8.690296	14.28
36	.619901	14.42	.638389	15.05	36	.670332	13.60	.691153	14.25
37	.620766	14.42	.639292	15.05	37	.671148	13.58	.692008	14.25
38	.621631	14.40	.640195	15.02	38	.671963	13.57	.692863	14.25
39	.622495	14.38	.641096	15.02	39	.672777	13.55	.693718	14.22
40	8.623358	14.37	8.641997	15.00	40	8.673590	13.55	8.694571	14.22
41	.624220	14.35	.642897	14.98	41	.674403	13.53	.695424	14.20
42	.625081	14.33	.643796	14.97	42	.675215	13.52	.696276	14.18
43	.625941	14.33	.644694	14.95	43	.676026	13.50	.697127	14.18
44	.626801	14.30	.645591	14.95	44	.676836	13.48	.697978	14.17
45	8.627659	14.30	8.646488	14.93	45	8.677645	13.48	8.698828	14.15
46	.628517	14.28	.647384	14.92	46	.678454	13.47	.699677	14.13
47	.629374	14.27	.648279	14.90	47	.679262	13.45	.700525	14.13
48	.630230	14.25	.649173	14.88	48	.680069	13.43	.701373	14.12
49	.631085	14.23	.650066	14.87	49	.680875	13.43	.702220	14.10
50	8.631939	14.22	8.650958	14.87	50	8.681681	13.42	8.703066	14.10
51	.632792	14.22	.651850	14.85	51	.682486	13.40	.703912	14.07
52	.633645	14.18	.652741	14.83	52	.683290	13.38	.704756	14.07
53	.634496	14.18	.653631	14.82	53	.684093	13.38	.705600	14.07
54	.635347	14.17	.654520	14.80	54	.684896	13.35	.706444	14.03
55	8.636197	14.15	8.655408	14.80	55	8.685697	13.35	8.707286	14.03
56	.637046	14.13	.656296	14.77	56	.686498	13.35	.708128	14.02
57	.637894	14.13	.657182	14.77	57	.687299	13.32	.708969	14.02
58	.638742	14.10	.658068	14.77	58	.688098	13.32	.709810	14.00
59	.639588	14.10	.658954	14.73	59	.688897	13.30	.710650	13.98
60	8.640434		8.659838		60	8.689695		8.711489	

18°					19°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	8.689695	13.28	8.711489	13.97	0	8.736248	12.58	8.760578	13.30
1	.690492	13.28	.712327	13.95	1	.737003	12.57	.761376	13.30
2	.691289	13.25	.713164	13.95	2	.737757	12.55	.762174	13.28
3	.692084	13.25	.714001	13.95	3	.738510	12.55	.762971	13.27
4	.692879	13.25	.714838	13.92	4	.739263	12.53	.763767	13.27
5	8.693674	13.22	8.715673	13.92	5	8.740015	12.52	8.764563	13.25
6	.694467	13.22	.716508	13.90	6	.740766	12.50	.765358	13.23
7	.695260	13.20	.717342	13.88	7	.741516	12.50	.766152	13.23
8	.696052	13.18	.718175	13.88	8	.742266	12.50	.766946	13.22
9	.696843	13.18	.719008	13.87	9	.743016	12.47	.767739	13.20
10	8.697634	13.17	8.719840	13.85	10	8.743764	12.47	8.768531	13.20
11	.698424	13.15	.720671	13.85	11	.744512	12.45	.769323	13.18
12	.699213	13.13	.721502	13.83	12	.745259	12.45	.770114	13.18
13	.700001	13.13	.722332	13.82	13	.746006	12.43	.770905	13.17
14	.700789	13.12	.723161	13.80	14	.746752	12.42	.771695	13.15
15	8.701576	13.10	8.723989	13.80	15	8.747497	12.42	8.772484	13.15
16	.702362	13.08	.724817	13.78	16	.748242	12.40	.773273	13.13
17	.703147	13.08	.725644	13.78	17	.748986	12.38	.774061	13.13
18	.703932	13.07	.726471	13.77	18	.749729	12.38	.774849	13.10
19	.704716	13.05	.727297	13.75	19	.750472	12.37	.775635	13.12
20	8.705499	13.05	8.728122	13.73	20	8.751214	12.35	8.776422	13.08
21	.706282	13.02	.728946	13.73	21	.751955	12.35	.777207	13.10
22	.707063	13.02	.729770	13.72	22	.752696	12.33	.777993	13.07
23	.707844	13.02	.730593	13.70	23	.753436	12.32	.778777	13.07
24	.708625	12.98	.731415	13.70	24	.754175	12.32	.779561	13.05
25	8.709404	12.98	8.732237	13.68	25	8.754914	12.30	8.780344	13.05
26	.710183	12.97	.733058	13.67	26	.755652	12.28	.781127	13.03
27	.710961	12.97	.733878	13.67	27	.756389	12.28	.781909	13.02
28	.711739	12.95	.734698	13.65	28	.757126	12.27	.782690	13.02
29	.712516	12.93	.735517	13.63	29	.757862	12.27	.783471	13.00
30	8.713292	12.92	8.736335	13.63	30	8.758598	12.25	8.784251	13.00
31	.714067	12.92	.737153	13.62	31	.759333	12.23	.785031	12.98
32	.714842	12.90	.737970	13.60	32	.760067	12.23	.785810	12.97
33	.715616	12.88	.738786	13.60	33	.760801	12.22	.786588	12.97
34	.716389	12.87	.739602	13.58	34	.761534	12.20	.787366	12.97
35	8.717161	12.87	8.740417	13.57	35	8.762266	12.20	8.788144	12.93
36	.717933	12.85	.741231	13.57	36	.762998	12.18	.788920	12.93
37	.718704	12.85	.742045	13.55	37	.763729	12.17	.789696	12.93
38	.719475	12.82	.742858	13.53	38	.764459	12.17	.790472	12.92
39	.720244	12.82	.743670	13.53	39	.765189	12.15	.791247	12.90
40	8.721013	12.82	8.744482	13.52	40	8.765918	12.15	8.792021	12.90
41	.721782	12.78	.745293	13.50	41	.766647	12.12	.792795	12.88
42	.722549	12.78	.746103	13.50	42	.767374	12.13	.793568	12.87
43	.723316	12.78	.746913	13.48	43	.768102	12.10	.794340	12.87
44	.724083	12.75	.747722	13.47	44	.768828	12.10	.795112	12.87
45	8.724848	12.75	8.748530	13.47	45	8.769554	12.10	8.795884	12.83
46	.725613	12.73	.749338	13.45	46	.770280	12.08	.796654	12.85
47	.726377	12.72	.750145	13.43	47	.771005	12.07	.797425	12.82
48	.727140	12.72	.750951	13.43	48	.771729	12.05	.798194	12.82
49	.727903	12.70	.751757	13.42	49	.772452	12.05	.798963	12.82
50	8.728665	12.70	8.752562	13.42	50	8.773175	12.05	8.799732	12.80
51	.729427	12.67	.753367	13.40	51	.773898	12.02	.800500	12.78
52	.730187	12.67	.754171	13.38	52	.774619	12.02	.801267	12.78
53	.730947	12.67	.754974	13.37	53	.775340	12.02	.802034	12.77
54	.731707	12.63	.755776	13.37	54	.776061	12.00	.802800	12.75
55	8.732465	12.63	8.756578	13.37	55	8.776781	11.98	8.803565	12.75
56	.733223	12.63	.757380	13.33	56	.777500	11.97	.804330	12.75
57	.733981	12.60	.758180	13.33	57	.778218	11.97	.805095	12.73
58	.734737	12.60	.758980	13.33	58	.778936	11.97	.805859	12.72
59	.735493	12.58	.759780	13.30	59	.779654	11.93	.806622	12.72
60	8.736248		8.760578		60	8.780370		8.807385	

TABLE XV.—LOGARITHMIC VERSED SINES

20°					21°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	8.780370	11.95	8.807385	12.70	0	8.822296	11.35	8.852144	12.17
1	.781087	11.92	.808147	12.68	1	.822977	11.35	.852874	12.17
2	.781802	11.92	.808908	12.68	2	.823658	11.33	.853604	12.13
3	.782517	11.90	.809669	12.68	3	.824338	11.33	.854332	12.15
4	.783231	11.90	.810430	12.67	4	.825018	11.32	.855061	12.13
5	8.783945	11.88	8.811190	12.65	5	8.825697	11.32	8.855789	12.12
6	.784658	11.88	.811949	12.65	6	.826376	11.30	.856516	12.12
7	.785371	11.87	.812708	12.63	7	.827054	11.28	.857243	12.10
8	.786083	11.85	.813466	12.63	8	.827731	11.28	.857969	12.10
9	.786794	11.85	.814224	12.62	9	.828408	11.28	.858695	12.08
10	8.787505	11.83	8.814981	12.60	10	8.829085	11.27	8.859420	12.08
11	.788215	11.82	.815737	12.60	11	.829761	11.25	.860145	12.07
12	.788924	11.82	.816493	12.60	12	.830436	11.25	.860869	12.07
13	.789633	11.82	.817249	12.58	13	.831111	11.23	.861593	12.05
14	.790342	11.78	.818004	12.57	14	.831785	11.23	.862316	12.05
15	8.791049	11.78	8.818758	12.57	15	8.832459	11.22	8.863039	12.03
16	.791756	11.78	.819512	12.55	16	.833132	11.20	.863761	12.03
17	.792463	11.77	.820265	12.55	17	.833804	11.20	.864483	12.02
18	.793169	11.75	.821018	12.53	18	.834476	11.20	.865204	12.02
19	.793874	11.75	.821770	12.52	19	.835148	11.18	.865925	12.02
20	8.794579	11.73	8.822521	12.52	20	8.835819	11.17	8.866646	11.98
21	.795283	11.73	.823272	12.52	21	.836489	11.17	.867365	12.00
22	.795987	11.72	.824023	12.50	22	.837159	11.17	.868085	11.98
23	.796690	11.70	.824773	12.48	23	.837829	11.15	.868804	11.97
24	.797392	11.70	.825522	12.48	24	.838498	11.13	.869522	11.97
25	8.798094	11.68	8.826271	12.47	25	8.839166	11.13	8.870240	11.95
26	.798795	11.68	.827019	12.47	26	.839834	11.12	.870957	11.95
27	.799496	11.67	.827767	12.45	27	.840501	11.12	.871674	11.93
28	.800196	11.67	.828514	12.45	28	.841168	11.10	.872390	11.93
29	.800896	11.63	.829261	12.43	29	.841834	11.10	.873106	11.93
30	8.801594	11.65	8.830007	12.42	30	8.842500	11.08	8.873822	11.92
31	.802293	11.63	.830752	12.42	31	.843165	11.07	.874537	11.90
32	.802991	11.62	.831497	12.42	32	.843829	11.07	.875251	11.90
33	.803688	11.60	.832242	12.40	33	.844493	11.07	.875965	11.88
34	.804384	11.60	.832986	12.38	34	.845157	11.05	.876678	11.88
35	8.805080	11.60	8.833729	12.38	35	8.845820	11.05	8.877391	11.88
36	.805776	11.58	.834472	12.38	36	.846483	11.03	.878104	11.87
37	.806471	11.57	.835215	12.37	37	.847145	11.02	.878816	11.87
38	.807165	11.57	.835957	12.35	38	.847806	11.02	.879528	11.85
39	.807859	11.55	.836698	12.35	39	.848467	11.00	.880239	11.83
40	8.808552	11.53	8.837439	12.33	40	8.849127	11.00	8.880949	11.83
41	.809244	11.53	.838179	12.33	41	.849787	11.00	.881659	11.83
42	.809936	11.53	.838919	12.32	42	.850447	10.98	.882369	11.82
43	.810628	11.52	.839658	12.30	43	.851106	10.97	.883078	11.82
44	.811319	11.50	.840396	12.32	44	.851764	10.97	.883787	11.80
45	8.812009	11.50	8.841135	12.28	45	8.852422	10.95	8.884495	11.80
46	.812699	11.48	.841872	12.28	46	.853079	10.95	.885203	11.78
47	.813388	11.48	.842609	12.28	47	.853736	10.93	.885910	11.78
48	.814077	11.47	.843346	12.27	48	.854392	10.93	.886617	11.77
49	.814765	11.45	.844082	12.25	49	.855048	10.92	.887323	11.77
50	8.815452	11.45	8.844817	12.25	50	8.855703	10.92	8.888029	11.75
51	.816139	11.43	.845552	12.25	51	.856358	10.90	.888734	11.75
52	.816825	11.43	.846287	12.23	52	.857012	10.90	.889439	11.75
53	.817511	11.42	.847021	12.22	53	.857666	10.88	.890144	11.73
54	.818196	11.42	.847754	12.22	54	.858319	10.88	.890848	11.72
55	8.818881	11.40	8.848487	12.22	55	8.858972	10.87	8.891551	11.72
56	.819565	11.40	.849220	12.20	56	.859624	10.87	.892254	11.72
57	.820249	11.38	.849952	12.18	57	.860276	10.85	.892957	11.70
58	.820932	11.37	.850683	12.18	58	.860927	10.85	.893659	11.70
59	.821614	11.37	.851414	12.17	59	.861578	10.83	.894361	11.68
60	8.822296		8.852144		60	8.862228		8.895062	

	22°					23°			
M.	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**	**M.**	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**
0	8.862228	10.82	8.895062	11.68	0	8.900341	10.33	8.936315	11.23
1	.862877	10.83	.895763	11.67	1	.900961	10.35	.936989	11.23
2	.863527	10.80	.896463	11.67	2	.901582	10.32	.937663	11.22
3	.864175	10.80	.897163	11.65	3	.902201	10.33	.938336	11.22
4	.864823	10.80	.897862	11.65	4	.902821	10.32	.939009	11.22
5	8.865471	10.78	8.898561	11.63	5	8.903440	10.30	8.939682	11.20
6	.866118	10.78	.899259	11.63	6	.904058	10.30	.940354	11.20
7	.866765	10.77	.899957	11.63	7	.904676	10.28	.941026	11.20
8	.867411	10.77	.900655	11.62	8	.905293	10.28	.941698	11.18
9	.868057	10.75	.901352	11.60	9	.905910	10.28	.942369	11.17
10	8.868702	10.73	8.902048	11.62	10	8.906527	10.27	8.943039	11.18
11	.869346	10.75	.902745	11.58	11	.907143	10.27	.943710	11.15
12	.869991	10.72	.903440	11.60	12	.907759	10.25	.944379	11.17
13	.870634	10.72	.904136	11.57	13	.908374	10.25	.945049	11.15
14	.871277	10.72	.904830	11.58	14	.908989	10.23	.945718	11.13
15	8.871920	10.70	8.905525	11.57	15	8.909603	10.23	8.946386	11.13
16	.872562	10.70	.906219	11.55	16	.910217	10.22	.947054	11.13
17	.873204	10.68	.906912	11.55	17	.910830	10.22	.947722	11.12
18	.873845	10.68	.907605	11.55	18	.911443	10.22	.948389	11.12
19	.874486	10.67	.908298	11.53	19	.912056	10.20	.949056	11.12
20	8.875126	10.67	8.908990	11.52	20	8.912668	10.18	8.949723	11.10
21	.875766	10.65	.909681	11.52	21	.913279	10.20	.950389	11.10
22	.876405	10.65	.910372	11.52	22	.913891	10.17	.951055	11.08
23	.877044	10.63	.911063	11.52	23	.914501	10.17	.951720	11.08
24	.877682	10.63	.911754	11.48	24	.915111	10.17	.952385	11.07
25	8.878320	10.62	8.912443	11.50	25	8.915721	10.17	8.953049	11.07
26	.878957	10.62	.913133	11.48	26	.916331	10.15	.953713	11.07
27	.879594	10.60	.913822	11.47	27	.916940	10.13	.954377	11.05
28	.880230	10.60	.914510	11.47	28	.917548	10.13	.955040	11.05
29	.880866	10.58	.915198	11.47	29	.918156	10.13	.955703	11.05
30	8.881501	10.58	8.915886	11.45	30	8.918764	10.12	8.956366	11.03
31	.882136	10.58	.916573	11.45	31	.919371	10.10	.957028	11.03
32	.882771	10.57	.917260	11.43	32	.919977	10.12	.957690	11.02
33	.883405	10.55	.917946	11.43	33	.920584	10.10	.958351	11.02
34	.884038	10.55	.918632	11.43	34	.921190	10.08	.959012	11.00
35	8.884671	10.53	8.919318	11.42	35	8.921795	10.08	8.959672	11.00
36	.885303	10.53	.920003	11.40	36	.922400	10.07	.960332	11.00
37	.885935	10.53	.920687	11.42	37	.923004	10.07	.960992	10.98
38	.886567	10.52	.921372	11.38	38	.923608	10.07	.961651	10.98
39	.887198	10.52	.922055	11.40	39	.924212	10.05	.962310	10.98
40	8.887829	10.50	8.922739	11.37	40	8.924815	10.05	8.962969	10.97
41	.888459	10.48	.923421	11.38	41	.925418	10.03	.963627	10.97
42	.889088	10.48	.924104	11.37	42	.926020	10.03	.964285	10.95
43	.889717	10.48	.924786	11.35	43	.926622	10.03	.964942	10.95
44	.890346	10.47	.925467	11.37	44	.927224	10.02	.965599	10.95
45	8.890974	10.47	8.926149	11.33	45	8.927825	10.00	8.966256	10.93
46	.891602	10.45	.926829	11.35	46	.928425	10.00	.966912	10.93
47	.892229	10.45	.927510	11.32	47	.929025	10.00	.967568	10.92
48	.892856	10.43	.928189	11.33	48	.929625	9.98	.968223	10.92
49	.893482	10.43	.928869	11.32	49	.930224	9.98	.968878	10.92
50	8.894108	10.42	8.929548	11.30	50	8.930823	9.97	8.969533	10.90
51	.894733	10.42	.930226	11.32	51	.931421	9.97	.970187	10.90
52	.895358	10.42	.930905	11.28	52	.932019	9.97	.970841	10.88
53	.895983	10.40	.931582	11.30	53	.932617	9.95	.971494	10.88
54	.896607	10.38	.932260	11.27	54	.933214	9.95	.972147	10.88
55	8.897230	10.38	8.932936	11.28	55	8.933811	9.93	8.972800	10.87
56	.897853	10.38	.933613	11.27	56	.934407	9.93	.973452	10.87
57	.898476	10.37	.934289	11.27	57	.935003	9.92	.974104	10.87
58	.899098	10.35	.934965	11.25	58	.935598	9.92	.974756	10.85
59	.899719	10.37	.935640	11.25	59	.936193	9.92	.975407	10.85
60	8.900341		8.936315		60	8.936788		8.976058	

TABLE XV.—LOGARITHMIC VERSED SINES

24°					25°				
M.	**Vers.**	**D. 1".**	**Exsec.**	**D. 1".**	**M.**	**Vers.**	**D. 1".**	**Exsec.**	**D. 1".**
0	8.936788	9.90	8.976058	10.83	0	8.971703	9.50	9.014428	10.47
1	.937382	9.90	.976708	10.83	1	.972273	9.48	.015056	10.48
2	.937976	9.88	.977358	10.83	2	.972842	9.48	.015685	10.45
3	.938569	9.88	.978008	10.82	3	.973411	9.48	.016312	10.47
4	.939162	9.87	.978657	10.82	4	.973980	9.47	.016940	10.45
5	8.939754	9.87	8.979306	10.80	5	8.974548	9.47	9.017567	10.45
6	.940346	9.87	.979954	10.80	6	.975116	9.45	.018194	10.45
7	.940938	9.85	.980602	10.80	7	.975683	9.45	.018821	10.43
8	.941529	9.85	.981250	10.80	8	.976250	9.43	.019447	10.43
9	.942120	9.83	.981898	10.78	9	.976816	9.43	.020073	10.42
10	8.942710	9.83	8.982545	10.77	10	8.977382	9.43	9.020698	10.42
11	.943300	9.82	.983191	10.77	11	.977948	9.43	.021323	10.42
12	.943889	9.83	.983837	10.77	12	.978514	9.40	.021948	10.40
13	.944479	9.80	.984483	10.77	13	.979078	9.42	.022572	10.42
14	.945067	9.80	.985129	10.75	14	.979643	9.40	.023197	10.38
15	8.945655	9.80	8.985774	10.75	15	8.980207	9.40	9.023820	10.40
16	.946243	9.80	.986419	10.73	16	.980771	9.40	.024444	10.38
17	.946831	9.78	.987063	10.73	17	.981335	9.38	.025067	10.38
18	.947418	9.77	.987707	10.73	18	.981898	9.37	.025690	10.37
19	.948004	9.77	.988351	10.72	19	.982460	9.38	.026312	10.37
20	8.948590	9.77	8.988994	10.72	20	8.983023	9.37	9.026934	10.37
21	.949176	9.75	.989637	10.70	21	.983585	9.35	.027556	10.35
22	.949761	9.75	.990279	10.72	22	.984146	9.35	.028177	10.35
23	.950346	9.75	.990922	10.68	23	.984707	9.35	.028798	10.35
24	.950931	9.73	.991563	10.70	24	.985268	9.33	.029419	10.33
25	8.951515	9.73	8.992205	10.68	25	8.985828	9.33	9.030039	10.33
26	.952099	9.72	.992846	10.68	26	.986388	9.33	.030659	10.33
27	.952682	9.72	.993487	10.67	27	.986948	9.32	.031279	10.33
28	.953265	9.70	.994127	10.67	28	.987507	9.32	.031899	10.32
29	.953847	9.70	.994767	10.65	29	.988066	9.32	.032518	10.30
30	8.954429	9.70	8.995406	10.67	30	8.988625	9.30	9.033136	10.32
31	.955011	9.68	.996046	10.65	31	.989183	9.28	.033755	10.30
32	.955592	9.68	.996685	10.63	32	.989740	9.30	.034373	10.30
33	.956173	9.67	.997323	10.63	33	.990298	9.28	.034991	10.28
34	.956753	9.68	.997961	10.63	34	.990855	9.27	.035608	10.28
35	8.957334	9.65	8.998599	10.62	35	8.991411	9.28	9.036225	10.28
36	.957913	9.65	.999236	10.62	36	.991968	9.25	.036842	10.27
37	.958492	9.65	.999873	10.62	37	.992523	9.27	.037458	10.27
38	.959071	9.65	9.000510	10.62	38	.993079	9.25	.038074	10.27
39	.959650	9.62	.001147	10.60	39	.993634	9.25	.038690	10.25
40	8.960227	9.63	9.001783	10.58	40	8.994189	9.23	9.039305	10.25
41	.960805	9.62	.002418	10.58	41	.994743	9.23	.039920	10.25
42	.961382	9.62	.003053	10.58	42	.995297	9.23	.040535	10.25
43	.961959	9.60	.003688	10.58	43	.995851	9.22	.041150	10.23
44	.962535	9.60	.004323	10.57	44	.996404	9.22	.041764	10.23
45	8.963111	9.60	9.004957	10.57	45	8.996957	9.20	9.042378	10.22
46	.963687	9.58	.005591	10.55	46	.997509	9.22	.042991	10.22
47	.964262	9.58	.006224	10.57	47	.998062	9.18	.043604	10.22
48	.964837	9.57	.006858	10.53	48	.998613	9.20	.044217	10.22
49	.965411	9.57	.007490	10.55	49	.999165	9.18	.044830	10.20
50	8.965985	9.57	9.008123	10.53	50	8.999716	9.17	9.045442	10.20
51	.966559	9.55	.008755	10.53	51	9.000266	9.18	.046054	10.18
52	.967132	9.55	.009387	10.52	52	.000817	9.17	.046665	10.18
53	.967705	9.53	.010018	10.52	53	.001367	9.15	.047276	10.18
54	.968277	9.53	.010649	10.52	54	.001916	9.17	.047887	10.18
55	8.968849	9.53	9.011280	10.50	55	9.002466	9.13	9.048498	10.17
56	.969421	9.52	.011910	10.50	56	.003014	9.15	.049108	10.17
57	.969992	9.52	.012540	10.50	57	.003563	9.13	.049718	10.17
58	.970563	9.50	.013170	10.48	58	.004111	9.13	.050328	10.15
59	.971133	9.50	.013799	10.48	59	.004659	9.12	.050937	10.15
60	8.971703		9.014428		60	9.005206		9.051546	

	26°					27°			
M.	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**	**M**	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**
0	9.005206	9.12	9.051546	10.15	0	9.037401	8.77	9.087520	9.83
1	.005753	9.12	.052155	10.13	1	.037927	8.75	.088110	9.83
2	.006300	9.10	.052763	10.13	2	.038452	8.77	.088700	9.83
3	.006846	9.10	.053371	10.13	3	.038978	8.75	.089290	9.83
4	.007392	9.10	.053979	10.12	4	.039503	8.73	.089880	9.82
5	9.007938	9.08	9.054586	10.12	5	9.040027	8.75	9.090469	9.82
6	.008483	9.08	.055193	10.12	6	.040552	8.73	.091058	9.82
7	.009028	9.07	.055800	10.10	7	.041076	8.72	.091647	9.80
8	.009572	9.07	.056406	10.10	8	.041599	8.73	.092235	9.80
9	.010116	9.07	.057012	10.10	9	.042123	8.72	.092823	9.80
10	9.010660	9.05	9.057618	10.10	10	9.042646	8.70	9.093411	9.78
11	.011203	9.05	.058224	10.08	11	.043168	8.72	.093998	9.80
12	.011746	9.05	.058829	10.08	12	.043691	8.70	.094586	9.78
13	.012289	9.03	.059434	10.07	13	.044213	8.70	.095173	9.77
14	.012831	9.03	.060038	10.08	14	.044735	8.68	.095759	9.78
15	9.013373	9.03	9.060643	10.07	15	9.045256	8.68	9.096346	9.77
16	.013915	9.02	.061247	10.05	16	.045777	8.68	.096932	9.77
17	.014456	9.02	.061850	10.07	17	.046298	8.67	.097518	9.75
18	.014997	9.02	.062454	10.05	18	.046818	8.67	.098103	9.77
19	.015538	9.00	.063057	10.03	19	.047338	8.67	.098689	9.75
20	9.016078	9.00	9.063659	10.05	20	9.047858	8.65	9.099274	9.73
21	.016618	8.98	.064262	10.03	21	.048377	8.65	.099858	9.75
22	.017157	9.00	.064864	10.03	22	.048896	8.65	.100443	9.73
23	.017697	8.97	.065466	10.02	23	.049415	8.63	.101027	9.73
24	.018235	8.98	.066067	10.02	24	.049933	8.63	.101611	9.72
25	9.018774	8.97	9.066668	10.02	25	9.050451	8.63	9.102194	9.73
26	.019312	8.97	.067269	10.02	26	.050969	8.63	.102778	9.72
27	.019850	8.95	.067870	10.00	27	.051487	8.62	.103361	9.70
28	.020387	8.95	.068470	10.00	28	.052004	8.60	.103943	9.72
29	.020924	8.95	.069070	10.00	29	.052520	8.62	.104526	9.70
30	9.021461	8.93	9.069670	9.98	30	9.053037	8.60	9.105108	9.70
31	.021997	8.93	.070269	9.98	31	.053553	8.60	.105690	9.68
32	.022533	8.93	.070868	9.98	32	.054069	8.58	.106271	9.70
33	.023069	8.92	.071467	9.97	33	.054584	8.58	.106853	9.68
34	.023604	8.92	.072065	9.97	34	.055099	8.58	.107434	9.68
35	9.024139	8.90	9.072663	9.97	35	9.055614	8.58	9.108015	9.67
36	.024673	8.92	.073261	9.97	36	.056129	8.57	.108595	9.67
37	.025208	8.90	.073859	9.95	37	.056643	8.57	.109175	9.67
38	.025742	8.88	.074456	9.95	38	.057157	8.55	.109755	9.67
39	.026275	8.88	.075053	9.93	39	.057670	8.55	.110335	9.65
40	9.026808	8.88	9.075649	9.95	40	9.058183	8.55	9.110914	9.67
41	.027341	8.88	.076246	9.93	41	.058696	8.55	.111494	9.63
42	.027874	8.87	.076842	9.92	42	.059209	8.53	.112072	9.65
43	.028406	8.87	.077437	9.93	43	.059721	8.53	.112651	9.63
44	.028938	8.85	.078033	9.92	44	.060233	8.53	.113229	9.63
45	9.029469	8.85	9.078628	9.92	45	9.060745	8.52	9.113807	9.63
46	.030000	8.85	.079223	9.90	46	.061256	8.52	.114385	9.63
47	.030531	8.85	.079817	9.92	47	.061767	8.50	.114963	9.62
48	.031062	8.83	.080412	9.90	48	.062277	8.52	.115540	9.62
49	.031592	8.83	.081006	9.88	49	.062788	8.50	.116117	9.60
50	9.032122	8.82	9.081599	9.90	50	9.063298	8.48	9.116693	9.62
51	.032651	8.82	.082193	9.88	51	.063807	8.50	.117270	9.60
52	.033180	8.82	.082786	9.87	52	.064317	8.48	.117846	9.60
53	.033709	8.80	.083378	9.88	53	.064826	8.48	.118422	9.58
54	.034237	8.80	.083971	9.87	54	.065335	8.47	.118997	9.60
55	9.034765	8.80	9.084563	9.87	55	9.065843	8.47	9.119573	9.58
56	.035293	8.78	.085155	9.87	56	.066351	8.47	.120148	9.58
57	.035820	8.78	.085747	9.85	57	.066859	8.45	.120723	9.57
58	.036347	8.78	.086338	9.85	58	.067366	8.47	.121297	9.57
59	.036874	8.78	.086929	9.85	59	.067874	8.43	.121871	9.57
60	9.037401		9.087520		60	9.068380		9.122445	

28°					29°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.068380	8.45	9.122445	9.57	0	9.098229	8.15	9.156410	9.30
1	.068887	8.43	.123019	9.57	1	.098718	8.13	.156968	9.32
2	.069393	8.43	.123593	9.55	2	.099206	8.12	.157527	9.28
3	.069899	8.43	.124166	9.55	3	.099693	8.13	.158084	9.30
4	.070405	8.42	.124739	9.53	4	.100181	8.12	.158642	9.30
5	9.070910	8.42	9.125311	9.55	5	9.100668	8.12	9.159200	9.28
6	.071415	8.40	.125884	9.53	6	.101155	8.12	.159757	9.28
7	.071919	8.42	.126456	9.53	7	.101642	8.10	.160314	9.27
8	.072424	8.40	.127028	9.52	8	.102128	8.10	.160870	9.28
9	.072928	8.40	.127599	9.53	9	.102614	8.10	.161427	9.27
10	9.073432	8.38	9.128171	9.52	10	9.103100	8.08	9.161983	9.27
11	.073935	8.38	.128742	9.52	11	.103585	8.08	.162539	9.27
12	.074438	8.38	.129313	9.50	12	.104070	8.08	.163095	9.25
13	.074941	8.37	.129883	9.50	13	.104555	8.08	.163650	9.25
14	.075443	8.38	.130453	9.50	14	.105040	8.07	.164205	9.25
15	9.075946	8.35	9.131023	9.50	15	9.105524	8.07	9.164760	9.25
16	.076447	8.37	.131593	9.50	16	.106008	8.05	.165315	9.25
17	.076949	8.35	.132163	9.48	17	.106491	8.07	.165870	9.23
18	.077450	8.35	.132732	9.48	18	.106975	8.05	.166424	9.23
19	.077951	8.35	.133301	9.48	19	.107458	8.05	.166978	9.23
20	9.078452	8.33	9.133870	9.47	20	9.107941	8.03	9.167532	9.22
21	.078952	8.33	.134438	9.47	21	.108423	8.05	.168085	9.23
22	.079452	8.33	.135006	9.47	22	.108906	8.03	.168639	9.22
23	.079952	8.32	.135574	9.47	23	.109388	8.02	.169192	9.22
24	.080451	8.32	.136142	9.45	24	.109869	8.03	.169745	9.20
25	9.080950	8.32	9.136709	9.47	25	9.110351	8.02	9.170297	9.22
26	.081449	8.32	.137277	9.45	26	.110832	8.02	.170850	9.20
27	.081948	8.30	.137844	9.43	27	.111313	8.00	.171402	9.20
28	.082446	8.30	.138410	9.45	28	.111793	8.00	.171954	9.18
29	.082944	8.28	.138977	9.43	29	.112273	8.00	.172505	9.20
30	9.083441	8.30	9.139543	9.43	30	9.112753	8.00	9.173057	9.18
31	.083939	8.28	.140109	9.42	31	.113233	8.00	.173608	9.18
32	.084436	8.27	.140674	9.43	32	.113713	7.98	.174159	9.18
33	.084932	8.28	.141240	9.42	33	.114192	7.98	.174710	9.17
34	.085429	8.27	.141805	9.42	34	.114671	7.97	.175260	9.17
35	9.085925	8.25	9.142370	9.40	35	9.115149	7.97	9.175810	9.17
36	.086420	8.27	.142934	9.42	36	.115627	7.97	.176360	9.17
37	.086916	8.25	.143499	9.40	37	.116105	7.97	.176910	9.17
38	.087411	8.25	.144063	9.40	38	.116583	7.97	.177460	9.15
39	.087906	8.23	.144627	9.38	39	.117061	7.95	.178009	9.15
40	9.088400	8.25	9.145190	9.40	40	9.117538	7.95	9.178558	9.15
41	.088895	8.23	.145754	9.38	41	.118015	7.93	.179107	9.15
42	.089389	8.22	.146317	9.38	42	.118491	7.95	.179656	9.13
43	.089882	8.23	.146880	9.37	43	.118968	7.93	.180204	9.13
44	.090376	8.22	.147442	9.38	44	.119444	7.92	.180752	9.13
45	9.090869	8.22	9.148005	9.37	45	9.119919	7.93	9.181300	9.13
46	.091362	8.20	.148567	9.37	46	.120395	7.92	.181848	9.12
47	.091854	8.20	.149129	9.35	47	.120870	7.92	.182395	9.13
48	.092346	8.20	.149690	9.35	48	.121345	7.92	.182943	9.12
49	.092838	8.20	.150251	9.37	49	.121820	7.90	.183490	9.10
50	9.093330	8.18	9.150813	9.33	50	9.122294	7.90	9.184036	9.12
51	.093821	8.18	.151373	9.35	51	.122768	7.90	.184583	9.10
52	.094312	8.18	.151934	9.33	52	.123242	7.88	.185129	9.10
53	.094803	8.17	.152494	9.35	53	.123715	7.90	.185675	9.10
54	.095293	8.17	.153055	9.32	54	.124189	7.88	.186221	9.10
55	9.095783	8.17	9.153614	9.33	55	9.124662	7.87	9.186767	9.08
56	.096273	8.17	.154174	9.32	56	.125134	7.88	.187312	9.10
57	.096763	8.15	.154733	9.33	57	.125607	7.87	.187858	9.08
58	.097252	8.15	.155293	9.30	58	.126079	7.87	.188403	9.07
59	.097741	8.13	.155851	9.32	59	.126551	7.85	.188947	9.08
60	9.098229		9.156410		60	9.127022		9.189492	

30°					31°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	9.127022	7.87	9.189492	9.07	0	9.154828	7.58	9.221762	8.85
1	.127494	7.85	.190036	9.07	1	.155283	7.58	.222293	8.87
2	.127965	7.85	.190580	9.07	2	.155738	7.58	.222825	8.83
3	.128436	7.83	.191124	9.07	3	.156193	7.58	.223355	8.85
4	.128906	7.83	.191668	9.05	4	.156648	7.57	.223886	8.85
5	9.129376	7.83	9.192211	9.05	5	9.157102	7.57	9.224417	8.83
6	.129846	7.83	.192754	9.05	6	.157556	7.57	.224947	8.83
7	.130316	7.82	.193297	9.05	7	.158010	7.57	.225477	8.83
8	.130785	7.83	.193840	9.03	8	.158464	7.55	.226007	8.83
9	.131255	7.82	.194382	9.05	9	.158917	7.55	.226537	8.82
10	9.131724	7.80	9.194925	9.03	10	9.159370	7.55	9.227066	8.82
11	.132192	7.80	.195467	9.03	11	.159823	7.55	.227595	8.83
12	.132660	7.82	.196009	9.02	12	.160276	7.53	.228125	8.80
13	.133129	7.78	.196550	9.03	13	.160728	7.53	.228653	8.82
14	.133596	7.80	.197092	9.02	14	.161180	7.53	.229182	8.82
15	9.134064	7.78	9.197633	9.02	15	9.161632	7.52	9.229711	8.80
16	.134531	7.78	.198174	9.02	16	.162083	7.53	.230239	8.80
17	.134998	7.78	.198715	9.00	17	.162535	7.52	.230767	8.80
18	.135465	7.77	.199255	9.00	18	.162986	7.52	.231295	8.78
19	.135931	7.77	.199795	9.00	19	.163437	7.50	.231822	8.80
20	9.136397	7.77	9.200335	9.00	20	9.163887	7.52	9.232350	8.78
21	.136863	7.77	.200875	9.00	21	.164338	7.50	.232877	8.78
22	.137329	7.75	.201415	8.98	22	.164788	7.48	.233404	8.78
23	.137794	7.77	.201954	9.00	23	.165237	7.50	.233931	8.78
24	.138260	7.73	.202494	8.98	24	.165687	7.48	.234458	8.77
25	9.138724	7.75	9.203033	8.97	25	9.166136	7.48	9.234984	8.77
26	.139189	7.73	.203571	8.98	26	.166585	7.48	.235510	8.77
27	.139653	7.73	.204110	8.97	27	.167034	7.48	.236036	8.77
28	.140117	7.73	.204648	8.97	28	.167483	7.47	.236562	8.77
29	.140581	7.73	.205186	8.97	29	.167931	7.47	.237088	8.75
30	9.141045	7.72	9.205724	8.97	30	9.168379	7.47	9.237613	8.77
31	.141508	7.72	.206262	8.95	31	.168827	7.47	.238139	8.75
32	.141971	7.72	.206799	8.97	32	.169275	7.45	.238664	8.75
33	.142434	7.70	.207337	8.95	33	.169722	7.45	.239189	8.73
34	.142896	7.70	.207874	8.93	34	.170169	7.45	.239713	8.75
35	9.143358	7.70	9.208410	8.95	35	9.170616	7.43	9.240238	8.73
36	.143820	7.70	.208947	8.93	36	.171062	7.45	.240762	8.73
37	.144282	7.68	.209483	8.95	37	.171509	7.43	.241286	8.73
38	.144743	7.68	.210020	8.93	38	.171955	7.42	.241810	8.72
39	.145204	7.68	.210556	8.92	39	.172400	7.43	.242333	8.73
40	9.145665	7.68	9.211091	8.93	40	9.172846	7.42	9.242857	8.72
41	.146126	7.67	.211627	8.92	41	.173291	7.42	.243380	8.72
42	.146586	7.67	.212162	8.92	42	.173736	7.42	.243903	8.72
43	.147046	7.67	.212697	8.92	43	.174181	7.42	.244426	8.72
44	.147506	7.67	.213232	8.92	44	.174626	7.40	.244949	8.70
45	9.147966	7.65	9.213767	8.90	45	9.175070	7.40	9.245471	8.72
46	.148425	7.65	.214301	8.92	46	.175514	7.40	.245994	8.70
47	.148884	7.65	.214836	8.90	47	.175958	7.40	.246516	8.70
48	.149343	7.63	.215370	8.90	48	.176402	7.38	.247038	8.68
49	.149801	7.63	.215904	8.88	49	.176845	7.38	.247559	8.70
50	9.150259	7.63	9.216437	8.90	50	9.177288	7.38	9.248081	8.68
51	.150717	7.63	.216971	8.88	51	.177731	7.38	.248602	8.68
52	.151175	7.63	.217504	8.88	52	.178174	7.37	.249123	8.68
53	.151633	7.62	.218037	8.88	53	.178616	7.37	.249644	8.68
54	.152090	7.62	.218570	8.87	54	.179058	7.37	.250165	8.68
55	9.152547	7.60	9.219102	8.88	55	9.179500	7.37	9.250686	8.67
56	.153003	7.62	.219635	8.87	56	.179942	7.35	.251206	8.67
57	.153460	7.60	.220167	8.87	57	.180383	7.37	.251726	8.67
58	.153916	7.60	.220699	8.87	58	.180825	7.33	.252246	8.67
59	.154372	7.60	.221231	8.85	59	.181265	7.35	.252766	8.67
60	9.154828		9.221762		60	9.181706		9.253286	

TABLE XV.—LOGARITHMIC VERSED SINES

32°					33°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.181706	7.35	9.253286	8.65	0	9.207714	7.10	9.284122	8.48
1	.182147	7.33	.253805	8.65	1	.208140	7.10	.284631	8.47
2	.182587	7.33	.254324	8.65	2	.208566	7.10	.285139	8.47
3	.183027	7.32	.254843	8.65	3	.208992	7.10	.285647	8.47
4	.183466	7.33	.255362	8.65	4	.209418	7.08	.286155	8.47
5	9.183906	7.32	9.255881	8.63	5	9.209843	7.08	9.286663	8.45
6	.184345	7.32	.256399	8.65	6	.210268	7.08	.287170	8.47
7	.184784	7.32	.256918	8.63	7	.210693	7.08	.287678	8.45
8	.185223	7.32	.257436	8.63	8	.211118	7.08	.288185	8.45
9	.185662	7.30	.257954	8.62	9	.211543	7.07	.288692	8.45
10	9.186100	7.30	9.258471	8.63	10	9.211967	7.07	9.289199	8.43
11	.186538	7.30	.258989	8.62	11	.212391	7.07	.289705	8.45
12	.186976	7.28	.259506	8.62	12	.212815	7.07	.290212	8.43
13	.187413	7.30	.260023	8.62	13	.213239	7.05	.290718	8.43
14	.187851	7.28	.260540	8.62	14	.213662	7.05	.291224	8.43
15	9.188288	7.27	9.261057	8.62	15	9.214085	7.05	9.291730	8.43
16	.188724	7.28	.261574	8.60	16	.214508	7.05	.292236	8.43
17	.189161	7.27	.262090	8.60	17	.214931	7.05	.292742	8.42
18	.189597	7.28	.262606	8.60	18	.215354	7.03	.293247	8.43
19	.190034	7.25	.263122	8.60	19	.215776	7.03	.293753	8.42
20	9.190469	7.27	9.263638	8.60	20	9.216198	7.03	9.294258	8.42
21	.190905	7.27	.264154	8.58	21	.216620	7.03	.294763	8.42
22	.191341	7.25	.264669	8.58	22	.217042	7.02	.295268	8.40
23	.191776	7.25	.265184	8.60	23	.217463	7.02	.295772	8.42
24	.192211	7.23	.265700	8.57	24	.217884	7.02	.296277	8.40
25	9.192645	7.25	9.266214	8.58	25	9.218305	7.02	9.296781	8.40
26	.193080	7.23	.266729	8.58	26	.218726	7.00	.297285	8.40
27	.193514	7.23	.267244	8.57	27	.219146	7.02	.297789	8.40
28	.193948	7.23	.267758	8.57	28	.219567	7.00	.298293	8.40
29	.194382	7.22	.268272	8.57	29	.219987	7.00	.298797	8.38
30	9.194815	7.23	9.268786	8.57	30	9.220407	6.98	9.299300	8.38
31	.195249	7.22	.269300	8.57	31	.220826	7.00	.299803	8.40
32	.195682	7.22	.269814	8.55	32	.221246	6.98	.300307	8.37
33	.196115	7.20	.270327	8.55	33	.221665	6.98	.300809	8.38
34	.196547	7.22	.270840	8.57	34	.222084	6.98	.301312	8.38
35	9.196980	7.20	9.271354	8.53	35	9.222503	6.97	9.301815	8.37
36	.197412	7.20	.271866	8.55	36	.222921	6.98	.302317	8.38
37	.197844	7.18	.272379	8.55	37	.223340	6.97	.302820	8.37
38	.198275	7.20	.272892	8.53	38	.223758	6.97	.303322	8.37
39	.198707	7.18	.273404	8.53	39	.224176	6.95	.303824	8.35
40	9.199138	7.18	9.273916	8.53	40	9.224593	6.97	9.304325	8.37
41	.199569	7.18	.274428	8.53	41	.225011	6.95	.304827	8.35
42	.200000	7.17	.274940	8.53	42	.225428	6.95	.305328	8.37
43	.200430	7.18	.275452	8.52	43	.225845	6.95	.305830	8.35
44	.200861	7.17	.275963	8.52	44	.226262	6.93	.306331	8.35
45	9.201291	7.15	9.276474	8.53	45	9.226678	6.95	9.306832	8.35
46	.201720	7.17	.276986	8.50	46	.227095	6.93	.307333	8.33
47	.202150	7.15	.277496	8.52	47	.227511	6.93	.307833	8.35
48	.202579	7.15	.278007	8.52	48	.227927	6.92	.308334	8.33
49	.203008	7.15	.278518	8.50	49	.228342	6.93	.308834	8.33
50	9.203437	7.15	9.279028	8.50	50	9.228758	6.92	9.309334	8.33
51	.203866	7.13	.279538	8.50	51	.229173	6.92	.309834	8.33
52	.204294	7.15	.280048	8.50	52	.229588	6.92	.310334	8.33
53	.204723	7.13	.280558	8.50	53	.230003	6.92	.310834	8.32
54	.205151	7.12	.281068	8.48	54	.230418	6.90	.311333	8.32
55	9.205578	7.13	9.281577	8.50	55	9.230832	6.90	9.311832	8.32
56	.206006	7.12	.282087	8.48	56	.231246	6.90	.312331	8.32
57	.206433	7.12	.282596	8.48	57	.231660	6.90	.312830	8.32
58	.206860	7.12	.283105	8.48	58	.232074	6.88	.313329	8.32
59	.207287	7.12	.283614	8.47	59	.232487	6.90	.313828	8.30
60	9.207714		9.284122		60	9.232901		9.314326	

34°					35°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.232901	6.88	9.314326	8.32	0	9.257314	6.67	9.343949	8.15
1	.233314	6.88	.314825	8.30	1	.257714	6.68	.344438	8.15
2	.233727	6.87	.315323	8.30	2	.258115	6.67	.344927	8.15
3	.234139	6.88	.315821	8.30	3	.258515	6.67	.345416	8.13
4	.234552	6.87	.316319	8.30	4	.258915	6.65	.345904	8.15
5	9.234964	6.87	9.316817	8.28	5	9.259314	6.67	9.346393	8.13
6	.235376	6.87	.317314	8.28	6	.259714	6.65	.346881	8.13
7	.235788	6.85	.317811	8.30	7	.260113	6.65	.347369	8.13
8	.236199	6.87	.318309	8.28	8	.260512	6.65	.347857	8.13
9	.236611	6.85	.318806	8.28	9	.260911	6.65	.348345	8.13
10	9.237022	6.85	9.319303	8.27	10	9.261310	6.65	9.348833	8.13
11	.237433	6.85	.319799	8.28	11	.261709	6.63	.349321	8.12
12	.237844	6.83	.320296	8.27	12	.262107	6.63	.349808	8.12
13	.238254	6.85	.320792	8.28	13	.262505	6.63	.350295	8.12
14	.238665	6.83	.321289	8.27	14	.262903	6.63	.350782	8.12
15	9.239075	6.83	9.321785	8.27	15	9.263301	6.62	9.351269	8.12
16	.239485	6.82	.322281	8.25	16	.263698	6.63	.351756	8.12
17	.239894	6.83	.322776	8.27	17	.264096	6.62	.352243	8.12
18	.240304	6.82	.323272	8.27	18	.264493	6.62	.352730	8.10
19	.240713	6.82	.323768	8.25	19	.264890	6.62	.353216	8.10
20	9.241122	6.82	9.324263	8.25	20	9.265287	6.60	9.353702	8.10
21	.241531	6.82	.324758	8.25	21	.265683	6.62	.354188	8.10
22	.241940	6.80	.325253	8.25	22	.266080	6.60	.354674	8.10
23	.242348	6.80	.325748	8.25	23	.266476	6.60	.355160	8.10
24	.242756	6.80	.326243	8.23	24	.266872	6.58	.355646	8.08
25	9.243164	6.80	9.326737	8.25	25	9.267267	6.60	9.356131	8.10
26	.243572	6.80	.327232	8.23	26	.267663	6.58	.356617	8.08
27	.243980	6.78	.327726	8.23	27	.268058	6.58	.357102	8.08
28	.244387	6.78	.328220	8.23	28	.268453	6.58	.357587	8.08
29	.244794	6.78	.328714	8.22	29	.268848	6.58	.358072	8.08
30	9.245201	6.78	9.329207	8.23	30	9.269243	6.58	9.358557	8.08
31	.245608	6.77	.329701	8.23	31	.269638	6.57	.359042	8.07
32	.246014	6.78	.330195	8.22	32	.270032	6.57	.359526	8.08
33	.246421	6.77	.330688	8.22	33	.270426	6.57	.360011	8.07
34	.246827	6.77	.331181	8.22	34	.270820	6.57	.360495	8.07
35	9.247233	6.77	9.331674	8.22	35	9.271214	6.57	9.360979	8.07
36	.247639	6.75	.332167	8.20	36	.271608	6.55	.361463	8.07
37	.248044	6.75	.332659	8.22	37	.272001	6.55	.361947	8.07
38	.248449	6.75	.333152	8.20	38	.272394	6.55	.362431	8.05
39	.248854	6.75	.333644	8.22	39	.272787	6.55	.362914	8.07
40	9.249259	6.75	9.334137	8.20	40	9.273180	6.53	9.363398	8.05
41	.249664	6.73	.334629	8.20	41	.273572	6.55	.363881	8.05
42	.250068	6.75	.335121	8.18	42	.273965	6.53	.364364	8.05
43	.250473	6.73	.335612	8.20	43	.274357	6.53	.364847	8.05
44	.250877	6.73	.336104	8.18	44	.274749	6.53	.365330	8.05
45	9.251281	6.72	9.336595	8.20	45	9.275141	6.52	9.365813	8.03
46	.251684	6.73	.337087	8.18	46	.275532	6.53	.366295	8.05
47	.252088	6.72	.337578	8.18	47	.275924	6.52	.366778	8.03
48	.252491	6.72	.338069	8.18	48	.276315	6.52	.367260	8.03
49	.252894	6.72	.338560	8.17	49	.276706	6.52	.367742	8.03
50	9.253297	6.70	9.339050	8.18	50	9.277097	6.52	9.368224	8.03
51	.253699	6.72	.339541	8.17	51	.277488	6.50	.368706	8.03
52	.254102	6.70	.340031	8.18	52	.277878	6.50	.369188	8.03
53	.254504	6.70	.340522	8.17	53	.278268	6.50	.369670	8.02
54	.254906	6.70	.341012	8.17	54	.278658	6.50	.370151	8.02
55	9.255308	6.68	9.341502	8.15	55	9.279048	6.50	9.370632	8.03
56	.255709	6.70	.341991	8.17	56	.279438	6.48	.371114	8.02
57	.256111	6.68	.342481	8.17	57	.279827	6.50	.371595	8.02
58	.256512	6.68	.342971	8.15	58	.280217	6.48	.372076	8.00
59	.256913	6.68	.343460	8.15	59	.280606	6.48	.372556	8.02
60	9.257314		9.343949		60	9.280995		9.373037	

TABLE XV.—LOGARITHMIC VERSED SINES

36°					37°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.280995	6.47	9.373037	8.02	0	9.303983	6.28	9.401634	7.88
1	.281383	6.48	.373518	8.00	1	.304360	6.30	.402107	7.88
2	.281772	6.47	.373998	8.00	2	.304738	6.28	.402580	7.87
3	.282160	6.47	.374478	8.00	3	.305115	6.28	.403052	7.87
4	.282548	6.47	.374958	8.00	4	.305492	6.27	.403524	7.88
5	9.282936	6.47	9.375438	8.00	5	9.305868	6.28	9.403997	7.87
6	.283324	6.47	.375918	8.00	6	.306245	6.27	.404469	7.87
7	.283712	6.45	.376398	7.98	7	.306621	6.28	.404941	7.85
8	.284099	6.45	.376877	8.00	8	.306998	6.27	.405412	7.87
9	.284486	6.45	.377357	7.98	9	.307374	6.25	.405884	7.87
10	9.284873	6.45	9.377836	7.98	10	9.307749	6.27	9.406356	7.85
11	.285260	6.45	.378315	7.98	11	.308125	6.27	.406827	7.85
12	.285647	6.43	.378794	7.98	12	.308501	6.25	.407298	7.87
13	.286033	6.43	.379273	7.98	13	.308876	6.25	.407770	7.85
14	.286419	6.43	.379752	7.98	14	.309251	6.25	.408241	7.85
15	9.286805	6.43	9.380231	7.97	15	9.309626	6.25	9.408712	7.85
16	.287191	6.43	.380709	7.98	16	.310001	6.23	.409183	7.83
17	.287577	6.42	.381188	7.97	17	.310375	6.25	.409653	7.85
18	.287962	6.43	.381666	7.97	18	.310750	6.23	.410124	7.83
19	.288348	6.42	.382144	7.97	19	.311124	6.23	.410594	7.85
20	9.288733	6.42	9.382622	7.97	20	9.311498	6.23	9.411065	7.83
21	.289118	6.40	.383100	7.95	21	.311872	6.22	.411535	7.83
22	.289502	6.42	.383577	7.97	22	.312245	6.23	.412005	7.83
23	.289887	6.40	.384055	7.95	23	.312619	6.22	.412475	7.83
24	.290271	6.40	.384532	7.97	24	.312992	6.22	.412945	7.83
25	9.290655	6.40	9.385010	7.95	25	9.313365	6.22	9.413415	7.82
26	.291039	6.40	.385487	7.95	26	.313738	6.22	.413884	7.83
27	.291423	6.40	.385964	7.95	27	.314111	6.22	.414354	7.82
28	.291807	6.38	.386441	7.95	28	.314484	6.20	.414823	7.83
29	.292190	6.38	.386918	7.93	29	.314856	6.20	.415293	7.82
30	9.292573	6.38	9.387394	7.95	30	9.315228	6.20	9.415762	7.82
31	.292956	6.38	.387871	7.93	31	.315600	6.20	.416231	7.82
32	.293339	6.38	.388347	7.95	32	.315972	6.20	.416700	7.80
33	.293722	6.37	.388824	7.93	33	.316344	6.20	.417168	7.82
34	.294104	6.37	.389300	7.93	34	.316716	6.18	.417637	7.82
35	9.294486	6.37	9.389776	7.93	35	9.317087	6.18	9.418106	7.80
36	.294868	6.37	.390252	7.92	36	.317458	6.18	.418574	7.80
37	.295250	6.37	.390727	7.93	37	.317829	6.18	.419042	7.82
38	.295632	6.37	.391203	7.92	38	.318200	6.18	.419511	7.80
39	.296014	6.35	.391678	7.93	39	.318571	6.17	.419979	7.80
40	9.296395	6.35	9.392154	7.92	40	9.318941	6.17	9.420447	7.80
41	.296776	6.35	.392629	7.92	41	.319311	6.18	.420915	7.78
42	.297157	6.35	.393104	7.92	42	.319682	6.15	.421382	7.80
43	.297538	6.33	.393579	7.92	43	.320051	6.17	.421850	7.78
44	.297918	6.35	.394054	7.92	44	.320421	6.17	.422317	7.80
45	9.298299	6.33	9.394529	7.90	45	9.320791	6.15	9.422785	7.78
46	.298679	6.33	.395003	7.92	46	.321160	6.17	.423252	7.78
47	.299059	6.33	.395478	7.90	47	.321530	6.15	.423719	7.78
48	.299439	6.33	.395952	7.90	48	.321899	6.13	.424186	7.78
49	.299819	6.32	.396426	7.90	49	.322267	6.15	.424653	7.78
50	9.300198	6.32	9.396900	7.90	50	9.322636	6.15	9.425120	7.78
51	.300577	6.33	.397374	7.90	51	.323005	6.13	.425587	7.77
52	.300957	6.30	.397848	7.90	52	.323373	6.13	.426053	7.78
53	.301335	6.32	.398322	7.88	53	.323741	6.13	.426520	7.77
54	.301714	6.32	.398795	7.90	54	.324109	6.13	.426986	7.77
55	9.302093	6.30	9.399269	7.88	55	9.324477	6.13	9.427452	7.77
56	.302471	6.30	.399742	7.88	56	.324845	6.12	.427918	7.77
57	.302849	6.30	.400215	7.88	57	.325212	6.13	.428384	7.77
58	.303227	6.30	.400688	7.88	58	.325580	6.12	.428850	7.77
59	.303605	6.30	.401161	7.88	59	.325947	6.12	.429316	7.77
60	9.303983		9.401634		60	9.326314		9.429782	

38°					39°				
M.	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**	**M.**	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**
0	9.326314	6.12	9.429782	7.75	0	9.348021	5.93	9.457518	7.65
1	.326681	6.10	.430247	7.77	1	.348377	5.95	.457977	7.65
2	.327047	6.12	.430713	7.75	2	.348734	5.93	.458436	7.65
3	.327414	6.10	.431178	7.75	3	.349090	5.93	.458895	7.63
4	.327780	6.10	.431643	7.75	4	.349446	5.93	.459353	7.65
5	9.328146	6.10	9.432108	7.75	5	9.349802	5.93	9.459812	7.63
6	.328512	6.10	.432573	7.75	6	.350158	5.93	.460270	7.65
7	.328878	6.08	.433038	7.75	7	.350514	5.92	.460729	7.63
8	.329243	6.10	.433503	7.73	8	.350869	5.93	.461187	7.63
9	.329609	6.08	.433967	7.75	9	.351225	5.92	.461645	7.63
10	9.329974	6.08	9.434432	7.73	10	9.351580	5.92	9.462103	7.63
11	.330339	6.08	.434896	7.75	11	.351935	5.92	.462561	7.63
12	.330704	6.08	.435361	7.73	12	.352290	5.90	.463019	7.63
13	.331069	6.07	.435825	7.73	13	.352644	5.92	.463477	7.62
14	.331433	6.08	.436289	7.73	14	.352999	5.90	.463934	7.63
15	9.331798	6.07	9.436753	7.73	15	9.353353	5.90	9.464392	7.62
16	.332162	6.07	.437217	7.72	16	.353707	5.92	.464849	7.63
17	.332526	6.07	.437680	7.73	17	.354062	5.88	.465307	7.62
18	.332890	6.07	.438144	7.73	18	.354415	5.90	.465764	7.62
19	.333254	6.05	.438608	7.72	19	.354769	5.90	.466221	7.62
20	9.333617	6.07	9.439071	7.72	20	9.355123	5.88	9.466678	7.62
21	.333981	6.05	.439534	7.72	21	.355476	5.88	.467135	7.62
22	.334344	6.05	.439997	7.72	22	.355829	5.88	.467592	7.62
23	.334707	6.05	.440460	7.72	23	.356182	5.88	.468049	7.62
24	.335070	6.03	.440923	7.72	24	.356535	5.88	.468506	7.60
25	9.335432	6.05	9.441386	7.72	25	9.356888	5.88	9.468962	7.60
26	.335795	6.03	.441849	7.72	26	.357241	5.87	.469418	7.62
27	.336157	6.03	.442312	7.70	27	.357593	5.87	.469875	7.60
28	.336519	6.03	.442774	7.72	28	.357945	5.87	.470331	7.60
29	.336881	6.03	.443237	7.70	29	.358297	5.87	.470787	7.60
30	9.337243	6.03	9.443699	7.70	30	9.358649	5.87	9.471243	7.60
31	.337605	6.02	.444161	7.70	31	.359001	5.87	.471699	7.60
32	.337966	6.03	.444623	7.70	32	.359353	5.85	.472155	7.60
33	.338328	6.02	.445085	7.70	33	.359704	5.87	.472611	7.60
34	.338689	6.02	.445547	7.70	34	.360056	5.85	.473067	7.58
35	9.339050	6.02	9.446009	7.68	35	9.360407	5.85	9.473522	7.60
36	.339411	6.00	.446470	7.70	36	.360758	5.83	.473978	7.58
37	.339771	6.02	.446932	7.68	37	.361108	5.85	.474433	7.58
38	.340132	6.00	.447393	7.70	38	.361459	5.85	.474888	7.58
39	.340492	6.00	.447855	7.68	39	.361810	5.83	.475343	7.58
40	9.340852	6.00	9.448316	7.68	40	9.362160	5.83	9.475798	7.58
41	.341212	6.00	.448777	7.68	41	.362510	5.83	.476253	7.58
42	.341572	6.00	.449238	7.68	42	.362860	5.83	.476708	7.58
43	.341932	5.98	.449699	7.68	43	.363210	5.83	.477163	7.58
44	.342291	6.00	.450160	7.67	44	.363560	5.82	.477618	7.57
45	9.342651	5.98	9.450620	7.68	45	9.363909	5.83	9.478072	7.58
46	.343010	5.98	.451081	7.67	46	.364259	5.82	.478527	7.57
47	.343369	5.98	.451541	7.68	47	.364608	5.82	.478981	7.57
48	.343728	5.97	.452002	7.67	48	.364957	5.82	.479435	7.58
49	.344086	5.98	.452462	7.67	49	.365306	5.82	.479890	7.57
50	9.344445	5.97	9.452922	7.67	50	9.365655	5.80	9.480344	7.57
51	.344803	5.97	.453382	7.67	51	.366003	5.82	.480798	7.57
52	.345161	5.97	.453842	7.67	52	.366352	5.80	.481252	7.55
53	.345519	5.97	.454302	7.67	53	.366700	5.80	.481705	7.57
54	.345877	5.97	.454762	7.65	54	.367048	5.80	.482159	7.57
55	9.346235	5.95	9.455221	7.67	55	9.367396	5.80	9.482613	7.55
56	.346592	5.97	.455681	7.65	56	.367744	5.78	.483066	7.57
57	.346950	5.95	.456140	7.67	57	.368091	5.80	.483520	7.55
58	.347307	5.95	.456600	7.65	58	.368439	5.78	.483973	7.55
59	.347664	5.95	.457059	7.65	59	.368786	5.78	.484426	7.55
60	9.348021		9.457518		60	9.369133		9.484879	

TABLE XV.—LOGARITHMIC VERSED SINES

40°					41°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.369133	5.78	9.484879	7.55	0	9.389681	5.62	9.511901	7.45
1	.369480	5.78	.485332	7.55	1	.390018	5.63	.512348	7.47
2	.369827	5.78	.485785	7.55	2	.390356	5.63	.512796	7.45
3	.370174	5.77	.486238	7.55	3	.390694	5.62	.513243	7.47
4	.370520	5.78	.486691	7.55	4	.391031	5.62	.513691	7.45
5	9.370867	5.77	9.487144	7.53	5	9.391368	5.62	9.514138	7.45
6	.371213	5.77	.487596	7.55	6	.391705	5.62	.514585	7.47
7	.371559	5.77	.488049	7.53	7	.392042	5.62	.515033	7.45
8	.371905	5.77	.488501	7.53	8	.392379	5.62	.515480	7.45
9	.372251	5.75	.488953	7.55	9	.392716	5.60	.515927	7.45
10	9.372596	5.77	9.489406	7.53	10	9.393052	5.60	9.516374	7.43
11	.372942	5.75	.489858	7.53	11	.393388	5.60	.516820	7.45
12	.373287	5.75	.490310	7.53	12	.393724	5.62	.517267	7.45
13	.373632	5.75	.490762	7.53	13	.394061	5.58	.517714	7.43
14	.373977	5.75	.491214	7.52	14	.394396	5.60	.518160	7.45
15	9.374322	5.75	9.491665	7.53	15	9.394732	5.60	9.518607	7.43
16	.374667	5.73	.492117	7.53	16	.395068	5.58	.519053	7.45
17	.375011	5.75	.492569	7.52	17	.395403	5.58	.519500	7.43
18	.375356	5.73	.493020	7.52	18	.395738	5.60	.519946	7.43
19	.375700	5.73	.493471	7.53	19	.396074	5.58	.520392	7.43
20	9.376044	5.73	9.493923	7.52	20	9.396409	5.57	9.520838	7.43
21	.376388	5.73	.494374	7.52	21	.396743	5.58	.521284	7.43
22	.376732	5.72	.494825	7.52	22	.397078	5.58	.521730	7.43
23	.377075	5.73	.495276	7.52	23	.397413	5.57	.522176	7.42
24	.377419	5.72	.495727	7.52	24	.397747	5.57	.522621	7.43
25	9.377762	5.72	9.496178	7.50	25	9.398081	5.57	9.523067	7.43
26	.378105	5.72	.496628	7.52	26	.398415	5.57	.523513	7.42
27	.378448	5.72	.497079	7.52	27	.398749	5.57	.523958	7.43
28	.378791	5.70	.497530	7.50	28	.399083	5.57	.524404	7.42
29	.379133	5.72	.497980	7.50	29	.399417	5.55	.524849	7.42
30	9.379476	5.70	9.498430	7.52	30	9.399750	5.57	9.525294	7.42
31	.379818	5.72	.498881	7.50	31	.400084	5.55	.525739	7.42
32	.380161	5.70	.499331	7.50	32	.400417	5.55	.526184	7.42
33	.380503	5.70	.499781	7.50	33	.400750	5.55	.526629	7.42
34	.380845	5.68	.500231	7.50	34	.401083	5.55	.527074	7.42
35	9.381186	5.70	9.500681	7.50	35	9.401416	5.53	9.527519	7.42
36	.381528	5.68	.501131	7.50	36	.401748	5.55	.527964	7.42
37	.381869	5.70	.501581	7.48	37	.402081	5.53	.528409	7.40
38	.382211	5.68	.502030	7.50	38	.402413	5.53	.528853	7.42
39	.382552	5.68	.502480	7.48	39	.402745	5.53	.529298	7.40
40	9.382893	5.68	9.502929	7.50	40	9.403077	5.53	9.529742	7.42
41	.383234	5.67	.503379	7.48	41	.403409	5.53	.530187	7.40
42	.383574	5.68	.503828	7.48	42	.403741	5.53	.530631	7.40
43	.383915	5.67	.504277	7.48	43	.404073	5.52	.531075	7.40
44	.384255	5.67	.504726	7.48	44	.404404	5.53	.531519	7.40
45	9.384595	5.67	9.505175	7.48	45	9.404736	5.52	9.531963	7.40
46	.384935	5.67	.505624	7.48	46	.405067	5.52	.532407	7.40
47	.385275	5.67	.506073	7.48	47	.405398	5.52	.532851	7.40
48	.385615	5.67	.506522	7.48	48	.405729	5.50	.533295	7.40
49	.385955	5.65	.506971	7.47	49	.406059	5.52	.533739	7.38
50	9.386294	5.67	9.507419	7.48	50	9.406390	5.52	9.534182	7.40
51	.386634	5.65	.507868	7.47	51	.406721	5.50	.534626	7.40
52	.386973	5.65	.508316	7.48	52	.407051	5.50	.535070	7.38
53	.387312	5.65	.508765	7.47	53	.407381	5.50	.535513	7.38
54	.387651	5.63	.509213	7.47	54	.407711	5.50	.535956	7.40
55	9.387989	5.65	9.509661	7.47	55	9.408041	5.50	9.536400	7.38
56	.388328	5.63	.510109	7.47	56	.408371	5.48	.536843	7.38
57	.388666	5.65	.510557	7.47	57	.408700	5.50	.537286	7.38
58	.389005	5.63	.511005	7.47	58	.409030	5.48	.537729	7.38
59	.389343	5.63	.511453	7.47	59	.409359	5.48	.538172	7.38
60	9.389681		9.511901		60	9.409688		9.538615	

42°					43°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.409688	5.48	9.538615	7.38	0	9.429181	5.35	9.565053	7.32
1	.410017	5.48	.539058	7.37	1	.429502	5.33	.565492	7.30
2	.410346	5.48	.539500	7.38	2	.429822	5.33	.565930	7.32
3	.410675	5.48	.539943	7.38	3	.430142	5.35	.566369	7.30
4	.411004	5.47	.540386	7.37	4	.430463	5.33	.566807	7.30
5	9.411332	5.47	9.540828	7.38	5	9.430783	5.33	9.567245	7.30
6	.411660	5.48	.541271	7.37	6	.431103	5.32	.567683	7.30
7	.411989	5.47	.541713	7.37	7	.431422	5.33	.568121	7.30
8	.412317	5.45	.542155	7.37	8	.431742	5.33	.568559	7.30
9	.412644	5.47	.542597	7.38	9	.432062	5.32	.568997	7.30
10	9.412972	5.47	9.543040	7.37	10	9.432381	5.32	9.569435	7.30
11	.413300	5.45	.543482	7.37	11	.432700	5.33	.569873	7.30
12	.413627	5.47	.543924	7.37	12	.433020	5.32	.570311	7.28
13	.413955	5.45	.544366	7.35	13	.433339	5.30	.570748	7.30
14	.414282	5.45	.544807	7.37	14	.433657	5.32	.571186	7.30
15	9.414609	5.45	9.545249	7.37	15	9.433976	5.32	9.571624	7.28
16	.414936	5.43	.545691	7.35	16	.434295	5.30	.572061	7.28
17	.415262	5.45	.546132	7.37	17	.434613	5.32	.572498	7.30
18	.415589	5.45	.546574	7.35	18	.434932	5.30	.572936	7.28
19	.415916	5.43	.547015	7.37	19	.435250	5.30	.573373	7.28
20	9.416242	5.43	9.547457	7.35	20	9.435568	5.30	9.573810	7.28
21	.416568	5.43	.547898	7.35	21	.435886	5.30	.574247	7.30
22	.416894	5.43	.548339	7.37	22	.436204	5.28	.574685	7.28
23	.417220	5.43	.548781	7.35	23	.436521	5.30	.575122	7.27
24	.417546	5.42	.549222	7.35	24	.436839	5.28	.575558	7.28
25	9.417871	5.43	9.549663	7.35	25	9.437156	5.28	9.575995	7.28
26	.418197	5.42	.550104	7.33	26	.437473	5.30	.576432	7.28
27	.418522	5.43	.550544	7.35	27	.437791	5.27	.576869	7.28
28	.418848	5.42	.550985	7.35	28	.438107	5.28	.577306	7.27
29	.419173	5.42	.551426	7.35	29	.438424	5.28	.577742	7.28
30	9.419498	5.40	9.551867	7.33	30	9.438741	5.28	9.578179	7.27
31	.419822	5.42	.552307	7.35	31	.439058	5.27	.578615	7.28
32	.420147	5.40	.552748	7.33	32	.439374	5.27	.579052	7.27
33	.420471	5.42	.553188	7.35	33	.439690	5.28	.579488	7.27
34	.420796	5.40	.553629	7.33	34	.440007	5.27	.579924	7.28
35	9.421120	5.40	9.554069	7.33	35	9.440323	5.27	9.580361	7.27
36	.421444	5.40	.554509	7.33	36	.440639	5.25	.580797	7.27
37	.421768	5.40	.554949	7.33	37	.440954	5.27	.581233	7.27
38	.422092	5.40	.555389	7.33	38	.441270	5.27	.581669	7.27
39	.422416	5.38	.555829	7.33	39	.441586	5.25	.582105	7.27
40	9.422739	5.40	9.556269	7.33	40	9.441901	5.25	9.582541	7.27
41	.423063	5.38	.556709	7.33	41	.442216	5.25	.582977	7.27
42	.423386	5.38	.557149	7.33	42	.442531	5.25	.583413	7.25
43	.423709	5.38	.557589	7.32	43	.442846	5.25	.583848	7.27
44	.424032	5.38	.558028	7.33	44	.443161	5.25	.584284	7.27
45	9.424355	5.37	9.558468	7.32	45	9.443476	5.23	9.584720	7.25
46	.424677	5.38	.558907	7.33	46	.443790	5.25	.585155	7.27
47	.425000	5.37	.559347	7.32	47	.444105	5.23	.585591	7.25
48	.425322	5.38	.559786	7.33	48	.444419	5.23	.586026	7.27
49	.425645	5.37	.560226	7.32	49	.444733	5.23	.586462	7.25
50	9.425967	5.37	9.560665	7.32	50	9.445047	5.23	9.586897	7.25
51	.426289	5.37	.561104	7.32	51	.445361	5.23	.587332	7.25
52	.426611	5.37	.561543	7.32	52	.445675	5.23	.587767	7.27
53	.426933	5.35	.561982	7.32	53	.445989	5.22	.588203	7.25
54	.427254	5.37	.562421	7.32	54	.446302	5.23	.588638	7.25
55	9.427576	5.35	9.562860	7.32	55	9.446616	5.22	9.589073	7.25
56	.427897	5.35	.563299	7.32	56	.446929	5.22	.589508	7.23
57	.428218	5.35	.563738	7.30	57	.447242	5.22	.589942	7.25
58	.428539	5.35	.564176	7.32	58	.447555	5.22	.590377	7.25
59	.428860	5.35	.564615	7.30	59	.447868	5.22	.590812	7.25
60	9.429181		9.565053		60	9.448181		9.591247	

44°					45°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	[illegible]	5.20	9.591247	7.23	0	9.466709	5.08	9.617224	7.20
1	[illegible]	5.22	.591681	7.25	1	.467014	5.08	.617656	7.18
2	[illegible]	5.20	.592116	7.25	2	.467319	5.08	.618087	7.18
3	[illegible]	5.22	.592551	7.23	3	.467624	5.07	.618518	7.18
4	[illegible]	5.20	.592985	7.23	4	.467928	5.08	.618949	7.18
5	[illegible]	5.20	9.593419	7.25	5	9.468233	5.07	9.619380	7.18
6	[illegible]	5.18	.593854	7.23	6	.468537	5.07	.619811	7.18
7	.450366	5.20	.594288	7.23	7	.468841	5.07	.620242	7.18
8	.450678	5.20	.594722	7.23	8	.469145	5.07	.620673	7.18
9	.450990	5.18	.595156	7.25	9	.469449	5.07	.621104	7.18
10	9.451301	5.18	9.595591	7.23	10	9.469753	5.07	9.621535	7.18
11	.451612	5.20	.596025	7.23	11	.470057	5.05	.621966	7.17
12	.451924	5.18	.596459	7.23	12	.470360	5.07	.622396	7.18
13	.452235	5.18	.596893	7.22	13	.470664	5.05	.622827	7.18
14	.452546	5.17	.597326	7.23	14	.470967	5.05	.623258	7.17
15	9.452856	5.18	9.597760	7.23	15	9.471270	5.05	9.623688	7.18
16	.453167	5.18	.598194	7.23	16	.471573	5.05	.624119	7.17
17	.453478	5.17	.598628	7.22	17	.471876	5.05	.624549	7.18
18	.453788	5.17	.599061	7.23	18	.472179	5.05	.624980	7.17
19	.454098	5.17	.599495	7.22	19	.472482	5.03	.625410	7.18
20	9.454408	5.17	9.599928	7.23	20	9.472784	5.05	9.625841	7.17
21	.454718	5.17	.600362	7.22	21	.473087	5.03	.626271	7.17
22	.455028	5.17	.600795	7.23	22	.473389	5.03	.626701	7.17
23	.455338	5.17	.601229	7.22	23	.473691	5.03	.627131	7.17
24	.455648	5.15	.601662	7.22	24	.473993	5.03	.627561	7.17
25	9.455957	5.17	9.602095	7.22	25	9.474295	5.03	9.627991	7.17
26	.456267	5.15	.602528	7.23	26	.474597	5.03	.628421	7.17
27	.456576	5.15	.602962	7.22	27	.474899	5.02	.628851	7.17
28	.456885	5.15	.603395	7.22	28	.475200	5.03	.629281	7.17
29	.457194	5.15	.603828	7.22	29	.475502	5.02	.629711	7.17
30	9.457503	5.13	9.604261	7.22	30	9.475803	5.02	9.630141	7.17
31	.457811	5.15	.604694	7.20	31	.476104	5.02	.630571	7.17
32	.458120	5.15	.605126	7.22	32	.476405	5.02	.631001	7.15
33	.458429	5.13	.605559	7.22	33	.476706	5.02	.631430	7.17
34	.458737	5.13	.605992	7.22	34	.477007	5.02	.631860	7.17
35	9.459045	5.13	9.606425	7.20	35	9.477308	5.00	9.632290	7.15
36	.459353	5.13	.606857	7.22	36	.477608	5.02	.632719	7.17
37	.459661	5.13	.607290	7.20	37	.477909	5.00	.633149	7.15
38	.459969	5.13	.607722	7.22	38	.478209	5.00	.633578	7.17
39	.460277	5.12	.608155	7.20	39	.478509	5.00	.634008	7.15
40	9.460584	5.13	9.608587	7.22	40	9.478809	5.00	9.634437	7.15
41	.460892	5.12	.609020	7.20	41	.479109	5.00	.634866	7.17
42	.461199	5.12	.609452	7.20	42	.479409	5.00	.635296	7.15
43	.461506	5.12	.609884	7.20	43	.479709	5.00	.635725	7.15
44	.461813	5.12	.610316	7.22	44	.480009	4.98	.636154	7.15
45	9.462120	5.12	9.610749	7.20	45	9.480308	5.00	9.636583	7.15
46	.462427	5.12	.611181	7.20	46	.480608	4.98	.637012	7.15
47	.462734	5.10	.611613	7.20	47	.480907	4.98	.637441	7.15
48	.463040	5.12	.612045	7.20	48	.481206	4.98	.637870	7.15
49	.463347	5.10	.612477	7.18	49	.481505	4.98	.638299	7.15
50	9.463653	5.10	9.612908	7.20	50	9.481804	4.98	9.638728	7.15
51	.463959	5.10	.613340	7.20	51	.482103	4.97	.639157	7.15
[illegible]	[illegible]	5.10	.613772	7.20	52	.482401	4.98	.639586	7.15
[illegible]	[illegible]	5.10	.614204	7.18	53	.482700	4.97	.640015	7.13
[illegible]	[illegible]	5.10	.614635	7.20	54	.482998	4.97	.640443	7.15
[illegible]	[illegible]	5.08	9.615067	7.20	55	9.483296	4.98	9.640872	7.15
[illegible]	[illegible]	5.10	.615499	7.18	56	.483595	4.97	.641301	7.13
[illegible]	[illegible]	5.08	.615930	7.20	57	.483893	4.97	.641729	7.15
[illegible]	[illegible]	5.08	.6[illegible]362	7.18	58	.484191	4.95	.642158	7.13
[illegible]	[illegible]	[illegible]	[illegible]	7.18	59	.484488	4.97	.642586	7.15
[illegible]	[illegible]		[illegible]		60	9.484786		9.643015	

46°					47°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.484786	4.97	9.643015	7.13	0	9.502429	4.85	9.668646	7.10
1	.485084	4.95	.643443	7.15	1	.502720	4.83	.669072	7.10
2	.485381	4.95	.643872	7.13	2	.503010	4.83	.669498	7.10
3	.485678	4.97	.644300	7.13	3	.503300	4.85	.669924	7.10
4	.485976	4.95	.644728	7.13	4	.503591	4.83	.670350	7.10
5	9.486273	4.95	9.645156	7.15	5	9.503881	4.83	9.670776	7.08
6	.486570	4.93	.645585	7.13	6	.504171	4.82	.671201	7.10
7	.486866	4.95	.646013	7.13	7	.504460	4.83	.671627	7.10
8	.487163	4.95	.646441	7.13	8	.504750	4.83	.672053	7.10
9	.487460	4.93	.646869	7.13	9	.505040	4.82	.672479	7.08
10	9.487756	4.95	9.647297	7.13	10	9.505329	4.82	9.672904	7.10
11	.488053	4.93	.647725	7.13	11	.505618	4.83	.673330	7.10
12	.488349	4.93	.648153	7.13	12	.505908	4.82	.673756	7.08
13	.488645	4.93	.648581	7.13	13	.506197	4.82	.674181	7.10
14	.488941	4.93	.649009	7.12	14	.506486	4.82	.674607	7.08
15	9.489237	4.93	9.649436	7.13	15	9.506775	4.80	9.675032	7.10
16	.489533	4.92	.649864	7.13	16	.507063	4.82	.675458	7.08
17	.489828	4.93	.650292	7.13	17	.507352	4.80	.675883	7.10
18	.490124	4.92	.650720	7.12	18	.507640	4.82	.676309	7.08
19	.490419	4.92	.651147	7.13	19	.507929	4.80	.676734	7.08
20	9.490714	4.93	9.651575	7.12	20	9.508217	4.80	9.677159	7.08
21	.491010	4.92	.652002	7.13	21	.508505	4.80	.677584	7.10
22	.491305	4.92	.652430	7.12	22	.508793	4.80	.678010	7.08
23	.491600	4.90	.652857	7.13	23	.509081	4.80	.678435	7.08
24	.491894	4.92	.653285	7.12	24	.509369	4.80	.678860	7.08
25	9.492189	4.92	9.653712	7.13	25	9.509657	4.80	9.679285	7.08
26	.492484	4.90	.654140	7.12	26	.509945	4.78	.679710	7.10
27	.492778	4.90	.654567	7.12	27	.510232	4.80	.680136	7.08
28	.493072	4.92	.654994	7.12	28	.510520	4.78	.680561	7.08
29	.493367	4.90	.655421	7.13	29	.510807	4.78	.680986	7.08
30	9.493661	4.90	9.655849	7.12	30	9.511094	4.78	9.681411	7.08
31	.493955	4.90	.656276	7.12	31	.511381	4.78	.681836	7.07
32	.494249	4.88	.656703	7.12	32	.511668	4.78	.682260	7.08
33	.494542	4.90	.657130	7.12	33	.511955	4.77	.682685	7.08
34	.494836	4.90	.657557	7.12	34	.512241	4.78	.683110	7.08
35	9.495130	4.88	9.657984	7.12	35	9.512528	4.78	9.683535	7.08
36	.495423	4.88	.658411	7.12	36	.512815	4.77	.683960	7.08
37	.495716	4.88	.658838	7.12	37	.513101	4.77	.684385	7.07
38	.496009	4.88	.659265	7.10	38	.513387	4.77	.684809	7.08
39	.496302	4.88	.659691	7.12	39	.513673	4.77	.685234	7.08
40	9.496595	4.88	9.660118	7.12	40	9.513959	4.77	9.685659	7.07
41	.496888	4.88	.660545	7.12	41	.514245	4.77	.686083	7.08
42	.497181	4.87	.660972	7.10	42	.514531	4.77	.686508	7.08
43	.497473	4.88	.661398	7.12	43	.514817	4.75	.686933	7.07
44	.497766	4.87	.661825	7.12	44	.515102	4.77	.687357	7.08
45	9.498058	4.87	9.662252	7.10	45	9.515388	4.75	9.687782	7.07
46	.498350	4.88	.662678	7.12	46	.515673	4.77	.688206	7.08
47	.498643	4.87	.663105	7.10	47	.515959	4.75	.688631	7.07
48	.498935	4.85	.663531	7.12	48	.516244	4.75	.689055	7.07
49	.499226	4.87	.663958	7.10	49	.516529	4.75	.689479	7.08
50	9.499518	4.87	9.664384	7.10	50	9.516814	4.73	9.689904	7.07
51	.499810	4.85	.664810	7.12	51	.517098	4.75	.690328	7.07
52	.500101	4.87	.665237	7.10	52	.517383	4.75	.690752	7.08
53	.500393	4.85	.665663	7.10	53	.517668	4.73	.691177	7.07
54	.500684	4.85	.666089	7.10	54	.517952	4.73	.691601	7.07
55	9.500975	4.85	9.666515	7.12	55	9.518236	4.75	9.692025	7.07
56	.501266	4.85	.666942	7.10	56	.518521	4.73	.692449	7.07
57	.501557	4.85	.667368	7.10	57	.518805	4.73	.692873	7.08
58	.501848	4.85	.667794	7.10	58	.519089	4.73	.693298	7.07
59	.502139	4.83	.668220	7.10	59	.519373	4.73	.693722	7.07
60	9.502429		9.668646		60	9.519657		9.694146	

44°					45°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.448181	5.20	9.591247	7.23	0	9.466709	5.08	9.617224	7.20
1	.448493	5.22	.591681	7.25	1	.467014	5.08	.617656	7.18
2	.448806	5.20	.592116	7.25	2	.467319	5.08	.618087	7.18
3	.449118	5.22	.592551	7.23	3	.467624	5.07	.618518	7.18
4	.449431	5.20	.592985	7.23	4	.467928	5.08	.618949	7.18
5	9.449743	5.20	9.593419	7.25	5	9.468233	5.07	9.619380	7.18
6	.450055	5.18	.593854	7.23	6	.468537	5.07	.619811	7.18
7	.450366	5.20	.594288	7.23	7	.468841	5.07	.620242	7.18
8	.450678	5.20	.594722	7.23	8	.469145	5.07	.620673	7.18
9	.450990	5.18	.595156	7.25	9	.469449	5.07	.621104	7.18
10	9.451301	5.18	9.595591	7.23	10	9.469753	5.07	9.621535	7.18
11	.451612	5.20	.596025	7.23	11	.470057	5.05	.621966	7.17
12	.451924	5.18	.596459	7.23	12	.470360	5.07	.622396	7.18
13	.452235	5.18	.596893	7.22	13	.470664	5.05	.622827	7.18
14	.452546	5.17	.597326	7.23	14	.470967	5.05	.623258	7.17
15	9.452856	5.18	9.597760	7.23	15	9.471270	5.05	9.623688	7.18
16	.453167	5.18	.598194	7.23	16	.471573	5.05	.624119	7.17
17	.453478	5.17	.598628	7.22	17	.471876	5.05	.624549	7.18
18	.453788	5.17	.599061	7.23	18	.472179	5.05	.624980	7.17
19	.454098	5.17	.599495	7.22	19	.472482	5.03	.625410	7.18
20	9.454408	5.17	9.599928	7.23	20	9.472784	5.05	9.625841	7.17
21	.454718	5.17	.600362	7.22	21	.473087	5.03	.626271	7.17
22	.455028	5.17	.600795	7.23	22	.473389	5.03	.626701	7.17
23	.455338	5.17	.601229	7.22	23	.473691	5.03	.627131	7.17
24	.455648	5.15	.601662	7.22	24	.473993	5.03	.627561	7.17
25	9.455957	5.17	9.602095	7.22	25	9.474295	5.03	9.627991	7.17
26	.456267	5.15	.602528	7.23	26	.474597	5.03	.628421	7.17
27	.456576	5.15	.602962	7.22	27	.474899	5.02	.628851	7.17
28	.456885	5.15	.603395	7.22	28	.475200	5.03	.629281	7.17
29	.457194	5.15	.603828	7.22	29	.475502	5.02	.629711	7.17
30	9.457503	5.13	9.604261	7.22	30	9.475803	5.02	9.630141	7.17
31	.457811	5.15	.604694	7.20	31	.476104	5.02	.630571	7.17
32	.458120	5.15	.605126	7.22	32	.476405	5.02	.631001	7.15
33	.458429	5.13	.605559	7.22	33	.476706	5.02	.631430	7.17
34	.458737	5.13	.605992	7.22	34	.477007	5.02	.631860	7.17
35	9.459045	5.13	9.606425	7.20	35	9.477308	5.00	9.632290	7.15
36	.459353	5.13	.606857	7.22	36	.477608	5.02	.632719	7.17
37	.459661	5.13	.607290	7.20	37	.477909	5.00	.633149	7.15
38	.459969	5.13	.607722	7.22	38	.478209	5.00	.633578	7.17
39	.460277	5.12	.608155	7.20	39	.478509	5.00	.634008	7.15
40	9.460584	5.13	9.608587	7.22	40	9.478809	5.00	9.634437	7.15
41	.460892	5.12	.609020	7.20	41	.479109	5.00	.634866	7.17
42	.461199	5.12	.609452	7.20	42	.479409	5.00	.635296	7.15
43	.461506	5.12	.609884	7.20	43	.479709	5.00	.635725	7.15
44	.461813	5.12	.610316	7.22	44	.480009	4.98	.636154	7.15
45	9.462120	5.12	9.610749	7.20	45	9.480308	5.00	9.636583	7.15
46	.462427	5.12	.611181	7.20	46	.480608	4.98	.637012	7.15
47	.462734	5.10	.611613	7.20	47	.480907	4.98	.637441	7.15
48	.463040	5.12	.612045	7.20	48	.481206	4.98	.637870	7.15
49	.463347	5.10	.612477	7.18	49	.481505	4.98	.638299	7.15
50	9.463653	5.10	9.612908	7.20	50	9.481804	4.98	9.638728	7.15
51	.463959	5.10	.613340	7.20	51	.482103	4.97	.639157	7.15
52	.464265	5.10	.613772	7.20	52	.482401	4.98	.639586	7.15
53	.464571	5.10	.614204	7.18	53	.482700	4.97	.640015	7.13
54	.464877	5.10	.614635	7.20	54	.482998	4.97	.640443	7.15
55	9.465183	5.08	9.615067	7.20	55	9.483296	4.98	9.640872	7.15
56	.465488	5.10	.615499	7.18	56	.483595	4.97	.641301	7.13
57	.465794	5.08	.615930	7.20	57	.483893	4.97	.641729	7.15
58	.466099	5.08	.616362	7.18	58	.484191	4.95	.642158	7.13
59	.466404	5.08	.616793	7.18	59	.484488	4.97	.642586	7.15
60	9.466709		9.617224		60	9.484786		9.643015	

46°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.484786	4.97	9.643015	7.13
1	.485084	4.95	.643443	7.15
2	.485381	4.95	.643872	7.13
3	.485678	4.97	.644300	7.13
4	.485976	4.95	.644728	7.13
5	9.486273	4.95	9.645156	7.15
6	.486570	4.93	.645585	7.13
7	.486866	4.95	.646013	7.13
8	.487163	4.95	.646441	7.13
9	.487460	4.93	.646869	7.13
10	9.487756	4.95	9.647297	7.13
11	.488053	4.93	.647725	7.13
12	.488349	4.93	.648153	7.13
13	.488645	4.93	.648581	7.13
14	.488941	4.93	.649009	7.12
15	9.489237	4.93	9.649436	7.13
16	.489533	4.92	.649864	7.13
17	.489828	4.93	.650292	7.13
18	.490124	4.92	.650720	7.12
19	.490419	4.92	.651147	7.13
20	9.490714	4.93	9.651575	7.12
21	.491010	4.92	.652002	7.13
22	.491305	4.92	.652430	7.12
23	.491600	4.90	.652857	7.13
24	.491894	4.92	.653285	7.12
25	9.492189	4.92	9.653712	7.13
26	.492484	4.90	.654140	7.12
27	.492778	4.90	.654567	7.12
28	.493072	4.92	.654994	7.12
29	.493367	4.90	.655421	7.13
30	9.493661	4.90	9.655849	7.12
31	.493955	4.90	.656276	7.12
32	.494249	4.88	.656703	7.12
33	.494542	4.90	.657130	7.12
34	.494836	4.90	.657557	7.12
35	9.495130	4.88	9.657984	7.12
36	.495423	4.88	.658411	7.12
37	.495716	4.88	.658838	7.12
38	.496009	4.88	.659265	7.10
39	.496302	4.88	.659691	7.12
40	9.496595	4.88	9.660118	7.12
41	.496888	4.88	.660545	7.12
42	.497181	4.87	.660972	7.10
43	.497473	4.88	.661398	7.12
44	.497766	4.87	.661825	7.12
45	9.498058	4.87	9.662252	7.10
46	.498350	4.88	.662678	7.12
47	.498643	4.87	.663105	7.10
48	.498935	4.85	.663531	7.12
49	.499226	4.87	.663958	7.10
50	9.499518	4.87	9.664384	7.10
51	.499810	4.85	.664810	7.12
52	.500101	4.87	.665237	7.10
53	.500393	4.85	.665663	7.10
54	.500684	4.85	.666089	7.10
55	9.500975	4.85	9.666515	7.12
56	.501266	4.85	.666942	7.10
57	.501557	4.85	.667368	7.10
58	.501848	4.85	.667794	7.10
59	.502139	4.83	.668220	7.10
60	9.502429		9.668646	

47°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.502429	4.85	9.668646	7.10
1	.502720	4.83	.669072	7.10
2	.503010	4.83	.669498	7.10
3	.503300	4.85	.669924	7.10
4	.503591	4.83	.670350	7.10
5	9.503881	4.83	9.670776	7.08
6	.504171	4.82	.671201	7.10
7	.504460	4.83	.671627	7.10
8	.504750	4.83	.672053	7.10
9	.505040	4.82	.672479	7.08
10	9.505329	4.82	9.672904	7.10
11	.505618	4.83	.673330	7.10
12	.505908	4.82	.673756	7.08
13	.506197	4.82	.674181	7.10
14	.506486	4.82	.674607	7.08
15	9.506775	4.80	9.675032	7.10
16	.507063	4.82	.675458	7.08
17	.507352	4.80	.675883	7.10
18	.507640	4.82	.676309	7.08
19	.507929	4.80	.676734	7.08
20	9.508217	4.80	9.677159	7.08
21	.508505	4.80	.677584	7.10
22	.508793	4.80	.678010	7.08
23	.509081	4.80	.678435	7.08
24	.509369	4.80	.678860	7.08
25	9.509657	4.80	9.679285	7.08
26	.509945	4.78	.679710	7.10
27	.510232	4.80	.680136	7.08
28	.510520	4.78	.680561	7.08
29	.510807	4.78	.680986	7.08
30	9.511094	4.78	9.681411	7.08
31	.511381	4.78	.681836	7.07
32	.511668	4.78	.682260	7.08
33	.511955	4.77	.682685	7.08
34	.512241	4.78	.683110	7.08
35	9.512528	4.78	9.683535	7.08
36	.512815	4.77	.683960	7.08
37	.513101	4.77	.684385	7.07
38	.513387	4.77	.684809	7.08
39	.513673	4.77	.685234	7.08
40	9.513959	4.77	9.685659	7.07
41	.514245	4.77	.686083	7.08
42	.514531	4.77	.686508	7.08
43	.514817	4.75	.686933	7.07
44	.515102	4.77	.687357	7.08
45	9.515388	4.75	9.687782	7.07
46	.515673	4.77	.688206	7.08
47	.515959	4.75	.688631	7.07
48	.516244	4.75	.689055	7.07
49	.516529	4.75	.689479	7.08
50	9.516814	4.73	9.689904	7.07
51	.517098	4.75	.690328	7.07
52	.517383	4.75	.690752	7.08
53	.517668	4.73	.691177	7.07
54	.517952	4.73	.691601	7.07
55	9.518236	4.75	9.692025	7.07
56	.518521	4.73	.692449	7.07
57	.518805	4.73	.692873	7.08
58	.519089	4.73	.693298	7.07
59	.519373	4.73	.693722	7.07
60	9.519657		9.694146	

TABLE XV.—LOGARITHMIC VERSED SINES

44°					45°				
M.	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**	**M.**	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**
0	9.448181	5.20	9.591247	7.23	0	9.466709	5.08	9.617224	7.20
1	.448493	5.22	.591681	7.25	1	.467014	5.08	.617656	7.18
2	.448806	5.20	.592116	7.25	2	.467319	5.08	.618087	7.18
3	.449118	5.22	.592551	7.23	3	.467624	5.07	.618518	7.18
4	.449431	5.20	.592985	7.23	4	.467928	5.08	.618949	7.18
5	9.449743	5.20	9.593419	7.25	5	9.468233	5.07	9.619380	7.18
6	.450055	5.18	.593854	7.23	6	.468537	5.07	.619811	7.18
7	.450366	5.20	.594288	7.23	7	.468841	5.07	.620242	7.18
8	.450678	5.20	.594722	7.23	8	.469145	5.07	.620673	7.18
9	.450990	5.18	.595156	7.25	9	.469449	5.07	.621104	7.18
10	9.451301	5.18	9.595591	7.23	10	9.469753	5.07	9.621535	7.18
11	.451612	5.20	.596025	7.23	11	.470057	5.05	.621966	7.17
12	.451924	5.18	.596459	7.23	12	.470360	5.07	.622396	7.18
13	.452235	5.18	.596893	7.22	13	.470664	5.05	.622827	7.18
14	.452546	5.17	.597326	7.23	14	.470967	5.05	.623258	7.17
15	9.452856	5.18	9.597760	7.23	15	9.471270	5.05	9.623688	7.18
16	.453167	5.18	.598194	7.23	16	.471573	5.05	.624119	7.17
17	.453478	5.17	.598628	7.22	17	.471876	5.05	.624549	7.18
18	.453788	5.17	.599061	7.23	18	.472179	5.05	.624980	7.17
19	.454098	5.17	.599495	7.22	19	.472482	5.03	.625410	7.18
20	9.454408	5.17	9.599928	7.23	20	9.472784	5.05	9.625841	7.17
21	.454718	5.17	.600362	7.22	21	.473087	5.03	.626271	7.17
22	.455028	5.17	.600795	7.23	22	.473389	5.03	.626701	7.17
23	.455338	5.17	.601229	7.22	23	.473691	5.03	.627131	7.17
24	.455648	5.15	.601662	7.22	24	.473993	5.03	.627561	7.17
25	9.455957	5.17	9.602095	7.22	25	9.474295	5.03	9.627991	7.17
26	.456267	5.15	.602528	7.23	26	.474597	5.03	.628421	7.17
27	.456576	5.15	.602962	7.22	27	.474899	5.02	.628851	7.17
28	.456885	5.15	.603395	7.22	28	.475200	5.03	.629281	7.17
29	.457194	5.15	.603828	7.22	29	.475502	5.02	.629711	7.17
30	9.457503	5.13	9.604261	7.22	30	9.475803	5.02	9.630141	7.17
31	.457811	5.15	.604694	7.20	31	.476104	5.02	.630571	7.17
32	.458120	5.15	.605126	7.22	32	.476405	5.02	.631001	7.15
33	.458429	5.13	.605559	7.22	33	.476706	5.02	.631430	7.17
34	.458737	5.13	.605992	7.22	34	.477007	5.02	.631860	7.17
35	9.459045	5.13	9.606425	7.20	35	9.477308	5.00	9.632290	7.15
36	.459353	5.13	.606857	7.22	36	.477608	5.02	.632719	7.17
37	.459661	5.13	.607290	7.20	37	.477909	5.00	.633149	7.15
38	.459969	5.13	.607722	7.22	38	.478209	5.00	.633578	7.17
39	.460277	5.12	.608155	7.20	39	.478509	5.00	.634008	7.15
40	9.460584	5.13	9.608587	7.22	40	9.478809	5.00	9.634437	7.15
41	.460892	5.12	.609020	7.20	41	.479109	5.00	.634866	7.17
42	.461199	5.12	.609452	7.20	42	.479409	5.00	.635296	7.15
43	.461506	5.12	.609884	7.20	43	.479709	5.00	.635725	7.15
44	.461813	5.12	.610316	7.22	44	.480009	4.98	.636154	7.15
45	9.462120	5.12	9.610749	7.20	45	9.480308	5.00	9.636583	7.15
46	.462427	5.12	.611181	7.20	46	.480608	4.98	.637012	7.15
47	.462734	5.10	.611613	7.20	47	.480907	4.98	.637441	7.15
48	.463040	5.12	.612045	7.20	48	.481206	4.98	.637870	7.15
49	.463347	5.10	.612477	7.18	49	.481505	4.98	.638299	7.15
50	9.463653	5.10	9.612908	7.20	50	9.481804	4.98	9.638728	7.15
51	.463959	5.10	.613340	7.20	51	.482103	4.97	.639157	7.15
52	.464265	5.10	.613772	7.20	52	.482401	4.98	.639586	7.15
53	.464571	5.10	.614204	7.18	53	.482700	4.97	.640015	7.13
54	.464877	5.10	.614635	7.20	54	.482998	4.97	.640443	7.15
55	9.465183	5.08	9.615067	7.20	55	9.483296	4.98	9.640872	7.15
56	.465488	5.10	.615499	7.18	56	.483595	4.97	.641301	7.13
57	.465794	5.08	.615930	7.20	57	.483893	4.97	.641729	7.15
58	.466099	5.08	.616362	7.18	58	.484191	4.95	.642158	7.13
59	.466404	5.08	.616793	7.18	59	.484488	4.97	.642586	7.15
60	9.466709		9.617224		60	9.484786		9.643015	

46°

M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.484786	4.97	9.643015	7.13
1	.485084	4.95	.643443	7.15
2	.485381	4.95	.643872	7.13
3	.485678	4.97	.644300	7.13
4	.485976	4.95	.644728	7.13
5	9.486273	4.95	9.645156	7.15
6	.486570	4.93	.645585	7.13
7	.486866	4.95	.646013	7.13
8	.487163	4.95	.646441	7.13
9	.487460	4.93	.646869	7.13
10	9.487756	4.95	9.647297	7.13
11	.488053	4.93	.647725	7.13
12	.488349	4.93	.648153	7.13
13	.488645	4.93	.648581	7.13
14	.488941	4.93	.649009	7.12
15	9.489237	4.93	9.649436	7.13
16	.489533	4.92	.649864	7.13
17	.489828	4.93	.650292	7.13
18	.490124	4.92	.650720	7.12
19	.490419	4.92	.651147	7.13
20	9.490714	4.93	9.651575	7.12
21	.491010	4.92	.652002	7.13
22	.491305	4.92	.652430	7.12
23	.491600	4.90	.652857	7.13
24	.491894	4.92	.653285	7.12
25	9.492189	4.92	9.653712	7.13
26	.492484	4.90	.654140	7.12
27	.492778	4.90	.654567	7.12
28	.493072	4.92	.654994	7.12
29	.493367	4.90	.655421	7.13
30	9.493661	4.90	9.655849	7.12
31	.493955	4.90	.656276	7.12
32	.494249	4.88	.656703	7.12
33	.494542	4.90	.657130	7.12
34	.494836	4.90	.657557	7.12
35	9.495130	4.88	9.657984	7.12
36	.495423	4.88	.658411	7.12
37	.495716	4.88	.658838	7.12
38	.496009	4.88	.659265	7.10
39	.496302	4.88	.659691	7.12
40	9.496595	4.88	9.660118	7.12
41	.496888	4.88	.660545	7.12
42	.497181	4.87	.660972	7.10
43	.497473	4.88	.661398	7.12
44	.497766	4.87	.661825	7.12
45	9.498058	4.87	9.662252	7.10
46	.498350	4.88	.662678	7.12
47	.498643	4.87	.663105	7.10
48	.498935	4.85	.663531	7.12
49	.499226	4.87	.663958	7.10
50	9.499518	4.87	9.664384	7.10
51	.499810	4.85	.664810	7.12
52	.500101	4.87	.665237	7.10
53	.500393	4.85	.665663	7.10
54	.500684	4.85	.666089	7.10
55	9.500975	4.85	9.666515	7.12
56	.501266	4.85	.666942	7.10
57	.501557	4.85	.667368	7.10
58	.501848	4.85	.667794	7.10
59	.502139	4.83	.668220	7.10
60	9.502429		9.668646	

47°

M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.502429	4.85	9.668646	7.10
1	.502720	4.83	.669072	7.10
2	.503010	4.83	.669498	7.10
3	.503300	4.85	.669924	7.10
4	.503591	4.83	.670350	7.10
5	9.503881	4.83	9.670776	7.08
6	.504171	4.82	.671201	7.10
7	.504460	4.83	.671627	7.10
8	.504750	4.83	.672053	7.10
9	.505040	4.82	.672479	7.08
10	9.505329	4.82	9.672904	7.10
11	.505618	4.83	.673330	7.10
12	.505908	4.82	.673756	7.08
13	.506197	4.82	.674181	7.10
14	.506486	4.82	.674607	7.08
15	9.506775	4.80	9.675032	7.10
16	.507063	4.82	.675458	7.08
17	.507352	4.80	.675883	7.10
18	.507640	4.82	.676309	7.08
19	.507929	4.80	.676734	7.08
20	9.508217	4.80	9.677159	7.08
21	.508505	4.80	.677584	7.10
22	.508793	4.80	.678010	7.08
23	.509081	4.80	.678435	7.08
24	.509369	4.80	.678860	7.08
25	9.509657	4.80	9.679285	7.08
26	.509945	4.78	.679710	7.10
27	.510232	4.80	.680136	7.08
28	.510520	4.78	.680561	7.08
29	.510807	4.78	.680986	7.08
30	9.511094	4.78	9.681411	7.08
31	.511381	4.78	.681836	7.07
32	.511668	4.78	.682260	7.08
33	.511955	4.77	.682685	7.08
34	.512241	4.78	.683110	7.08
35	9.512528	4.78	9.683535	7.08
36	.512815	4.77	.683960	7.08
37	.513101	4.77	.684385	7.07
38	.513387	4.77	.684809	7.08
39	.513673	4.77	.685234	7.08
40	9.513959	4.77	9.685659	7.07
41	.514245	4.77	.686083	7.08
42	.514531	4.77	.686508	7.08
43	.514817	4.75	.686933	7.07
44	.515102	4.77	.687357	7.08
45	9.515388	4.75	9.687782	7.07
46	.515673	4.77	.688206	7.08
47	.515959	4.75	.688631	7.07
48	.516244	4.75	.689055	7.07
49	.516529	4.75	.689479	7.08
50	9.516814	4.73	9.689904	7.07
51	.517098	4.75	.690328	7.07
52	.517383	4.75	.690752	7.08
53	.517668	4.73	.691177	7.07
54	.517952	4.73	.691601	7.07
55	9.518236	4.75	9.692025	7.07
56	.518521	4.73	.692449	7.07
57	.518805	4.73	.692873	7.08
58	.519089	4.73	.693298	7.07
59	.519373	4.73	.693722	7.07
60	9.519657		9.694146	

TABLE XV.—LOGARITHMIC VERSED SINES

48°					49°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.519657	4.72	9.694146	7.07	0	9.536484	4.62	9.719541	7.05
1	.519940	4.73	.694570	7.07	1	.536761	4.62	.719964	7.03
2	.520224	4.72	.694994	7.07	2	.537038	4.62	.720386	7.05
3	.520507	4.73	.695418	7.07	3	.537315	4.62	.720809	7.03
4	.520791	4.72	.695842	7.07	4	.537592	4.62	.721231	7.03
5	9.521074	4.72	9.696266	7.05	5	9.537869	4.60	9.721653	7.05
6	.521357	4.72	.696689	7.07	6	.538145	4.62	.722076	7.03
7	.521640	4.72	.697113	7.07	7	.538422	4.60	.722498	7.05
8	.521923	4.72	.697537	7.07	8	.538698	4.60	.722921	7.03
9	.522206	4.70	.697961	7.07	9	.538974	4.62	.723343	7.03
10	9.522488	4.72	9.698385	7.07	10	9.539251	4.60	9.723765	7.05
11	.522771	4.72	.698809	7.05	11	.539527	4.60	.724188	7.03
12	.523054	4.70	.699232	7.07	12	.539803	4.60	.724610	7.03
13	.523336	4.70	.699656	7.07	13	.540079	4.58	.725032	7.03
14	.523618	4.70	.700080	7.05	14	.540354	4.60	.725454	7.05
15	9.523900	4.70	9.700503	7.07	15	9.540630	4.60	9.725877	7.03
16	.524182	4.70	.700927	7.05	16	.540906	4.58	.726299	7.03
17	.524464	4.70	.701350	7.07	17	.541181	4.58	.726721	7.03
18	.524746	4.70	.701774	7.07	18	.541456	4.60	.727143	7.03
19	.525028	4.68	.702198	7.05	19	.541732	4.58	.727565	7.05
20	9.525309	4.70	9.702621	7.07	20	9.542007	4.58	9.727988	7.03
21	.525591	4.68	.703045	7.05	21	.542282	4.58	.728410	7.03
22	.525872	4.68	.703468	7.05	22	.542557	4.58	.728832	7.03
23	.526153	4.70	.703891	7.07	23	.542832	4.57	.729254	7.03
24	.526435	4.68	.704315	7.05	24	.543106	4.58	.729676	7.03
25	9.526716	4.68	9.704738	7.07	25	9.543381	4.57	9.730098	7.03
26	.526997	4.67	.705162	7.05	26	.543655	4.58	.730520	7.03
27	.527277	4.68	.705585	7.05	27	.543930	4.57	.730942	7.03
28	.527558	4.68	.706008	7.05	28	.544204	4.57	.731364	7.03
29	.527839	4.67	.706431	7.07	29	.544478	4.57	.731786	7.03
30	9.528119	4.68	9.706855	7.05	30	9.544752	4.57	9.732208	7.03
31	.528400	4.67	.707278	7.05	31	.545026	4.57	.732630	7.03
32	.528680	4.67	.707701	7.05	32	.545300	4.57	.733052	7.03
33	.528960	4.67	.708124	7.05	33	.545574	4.57	.733474	7.03
34	.529240	4.67	.708547	7.07	34	.545848	4.55	.733896	7.02
35	9.529520	4.67	9.708971	7.05	35	9.546121	4.57	9.734317	7.03
36	.529800	4.67	.709394	7.05	36	.546395	4.55	.734739	7.03
37	.530080	4.65	.709817	7.05	37	.546668	4.55	.735161	7.03
38	.530359	4.67	.710240	7.05	38	.546941	4.55	.735583	7.03
39	.530639	4.65	.710663	7.05	39	.547214	4.55	.736005	7.03
40	9.530918	4.67	9.711086	7.05	40	9.547487	4.55	9.736427	7.02
41	.531198	4.65	.711509	7.05	41	.547760	4.55	.736848	7.03
42	.531477	4.65	.711932	7.05	42	.548033	4.55	.737270	7.03
43	.531756	4.65	.712355	7.05	43	.548306	4.55	.737692	7.03
44	.532035	4.65	.712778	7.03	44	.548579	4.53	.738114	7.02
45	9.532314	4.63	9.713200	7.05	45	9.548851	4.55	9.738535	7.03
46	.532592	4.65	.713623	7.05	46	.549124	4.53	.738957	7.03
47	.532871	4.65	.714046	7.05	47	.549396	4.53	.739379	7.02
48	.533150	4.63	.714469	7.05	48	.549668	4.53	.739800	7.03
49	.533428	4.63	.714892	7.05	49	.549940	4.53	.740222	7.03
50	9.533706	4.65	9.715315	7.03	50	9.550212	4.53	9.740644	7.02
51	.533985	4.63	.715737	7.05	51	.550484	4.53	.741065	7.03
52	.534263	4.63	.716160	7.05	52	.550756	4.53	.741487	7.02
53	.534541	4.63	.716583	7.03	53	.551028	4.52	.741908	7.03
54	.534819	4.63	.717005	7.05	54	.551299	4.53	.742330	7.02
55	9.535097	4.62	9.717428	7.05	55	9.551571	4.52	9.742751	7.03
56	.535374	4.63	.717851	7.03	56	.551842	4.52	.743173	7.03
57	.535652	4.62	.718273	7.05	57	.552113	4.52	.743595	7.02
58	.535929	4.63	.718696	7.03	58	.552384	4.53	.744016	7.03
59	.536207	4.62	.719118	7.05	59	.552656	4.52	.744438	7.02
60	9.536484		9.719541		60	9.552927		9.744859	

50°					51°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1′
0	9.552927	4.50	9.744859	7.02	0	9.568999	4.42	9.770127	7.0
1	.553197	4.52	.745280	7.03	1	.569264	4.40	.770548	7.0
2	.553468	4.52	.745702	7.02	2	.569528	4.42	.770969	7.0
3	.553739	4.50	.746123	7.03	3	.569793	4.40	.771389	7.0
4	.554009	4.52	.746545	7.02	4	.570057	4.42	.771810	7.0
5	9.554280	4.50	9.746966	7.03	5	9.570322	4.40	9.772231	7.0
6	.554550	4.50	.747388	7.02	6	.570586	4.40	.772652	7.0
7	.554820	4.52	.747809	7.02	7	.570850	4.40	.773073	7.0
8	.555091	4.50	.748230	7.03	8	.571114	4.40	.773494	7.0
9	.555361	4.50	.748652	7.02	9	.571378	4.40	.773914	7.0
10	9.555631	4.48	9.749073	7.02	10	9.571642	4.40	9.774335	7.0
11	.555900	4.50	.749494	7.03	11	.571906	4.40	.774756	7.0
12	.556170	4.50	.749916	7.02	12	.572170	4.40	.775177	7.0
13	.556440	4.48	.750337	7.02	13	.572434	4.38	.775598	7.0
14	.556709	4.50	.750758	7.03	14	.572697	4.38	.776018	7.0
15	9.556979	4.48	9.751180	7.02	15	9.572960	4.40	9.776439	7.0
16	.557248	4.48	.751601	7.02	16	.573224	4.38	.776860	7.0
17	.557517	4.48	.752022	7.02	17	.573487	4.38	.777281	7.0
18	.557786	4.48	.752443	7.03	18	.573750	4.38	.777702	7.0
19	.558055	4.48	.752865	7.02	19	.574013	4.38	.778122	7.0
20	9.558324	4.48	9.753286	7.02	20	9.574276	4.38	9.778543	7.0
21	.558593	4.48	.753707	7.02	21	.574539	4.38	.778964	7.0
22	.558862	4.48	.754128	7.02	22	.574802	4.37	.779385	7.0
23	.559131	4.47	.754549	7.03	23	.575064	4.38	.779805	7.0
24	.559399	4.47	.754971	7.02	24	.575327	4.37	.780226	7.0
25	9.559667	4.48	9.755392	7.02	25	9.575589	4.38	9.780647	7.0
26	.559936	4.47	.755813	7.02	26	.575852	4.37	.781068	7.0
27	.560204	4.47	.756234	7.02	27	.576114	4.37	.781488	7.0
28	.560472	4.47	.756655	7.02	28	.576376	4.37	.781909	7.0
29	.560740	4.47	.757076	7.03	29	.576638	4.37	.782330	7.0
30	9.561008	4.47	9.757498	7.02	30	9.576900	4.37	9.782751	7.0
31	.561276	4.47	.757919	7.02	31	.577162	4.37	.783171	7.0
32	.561544	4.45	.758340	7.02	32	.577424	4.35	.783592	7.0
33	.561811	4.47	.758761	7.02	33	.577685	4.37	.784013	7.0
34	.562079	4.45	.759182	7.02	34	.577947	4.35	.784433	7.0
35	9.562346	4.45	9.759603	7.02	35	9.578208	4.37	9.784854	7.0
36	.562613	4.47	.760024	7.02	36	.578470	4.35	.785275	7.0
37	.562881	4.45	.760445	7.02	37	.578731	4.35	.785696	7.0
38	.563148	4.45	.760866	7.02	38	.578992	4.35	.786116	7.0
39	.563415	4.45	.761287	7.02	39	.579253	4.35	.786537	7.0
40	9.563682	4.43	9.761708	7.02	40	9.579514	4.35	9.786958	7.0
41	.563948	4.45	.762129	7.02	41	.579775	4.35	.787378	7.0
42	.564215	4.45	.762550	7.02	42	.580036	4.35	.787799	7.0
43	.564482	4.43	.762971	7.02	43	.580297	4.33	.788220	7.0
44	.564748	4.45	.763392	7.02	44	.580557	4.35	.788641	7.0
45	9.565015	4.43	9.763813	7.02	45	9.580818	4.33	9.789061	7.0
46	.565281	4.43	.764234	7.02	46	.581078	4.35	.789482	7.0
47	.565547	4.43	.764655	7.02	47	.581339	4.33	.789903	7.0
48	.565813	4.43	.765076	7.02	48	.581599	4.33	.790323	7.0
49	.566079	4.43	.765497	7.02	49	.581859	4.33	.790744	7.0
50	9.566345	4.43	9.765918	7.02	50	9.582119	4.33	9.791165	7.0
51	.566611	4.43	.766339	7.02	51	.582379	4.33	.791586	7.0
52	.566877	4.42	.766760	7.02	52	.582639	4.32	.792006	7.0
53	.567142	4.43	.767181	7.02	53	.582898	4.33	.792427	7.0
54	.567408	4.42	.767602	7.00	54	.583158	4.33	.792848	7.0
55	9.567673	4.42	9.768022	7.02	55	9.583418	4.32	9.793268	7.0
56	.567938	4.43	.768443	7.02	56	.583677	4.32	.793689	7.0
57	.568204	4.42	.768864	7.02	57	.583936	4.33	.794110	7.0
58	.568469	4.42	.769285	7.02	58	.584196	4.32	.794531	7.0
59	.568734	4.42	.769706	7.02	59	.584455	4.32	.794951	7.0
60	9.568999		9.770127		60	9.584714		9.795372	

48°					49°				
M.	**Vers.**	**D. 1".**	**Exsec.**	**D. 1".**	**M.**	**Vers.**	**D. 1".**	**Exsec.**	**D. 1".**
0	9.519657	4.72	9.694146	7.07	0	9.536484	4.62	9.719541	7.05
1	.519940	4.73	.694570	7.07	1	.536761	4.62	.719964	7.03
2	.520224	4.72	.694994	7.07	2	.537038	4.62	.720386	7.05
3	.520507	4.73	.695418	7.07	3	.537315	4.62	.720809	7.03
4	.520791	4.72	.695842	7.07	4	.537592	4.62	.721231	7.03
5	9.521074	4.72	9.696266	7.05	5	9.537869	4.60	9.721653	7.05
6	.521357	4.72	.696689	7.07	6	.538145	4.62	.722076	7.03
7	.521640	4.72	.697113	7.07	7	.538422	4.60	.722498	7.05
8	.521923	4.72	.697537	7.07	8	.538698	4.60	.722921	7.03
9	.522206	4.70	.697961	7.07	9	.538974	4.62	.723343	7.03
10	9.522488	4.72	9.698385	7.07	10	9.539251	4.60	9.723765	7.05
11	.522771	4.72	.698809	7.05	11	.539527	4.60	.724188	7.03
12	.523054	4.70	.699232	7.07	12	.539803	4.60	.724610	7.03
13	.523336	4.70	.699656	7.07	13	.540079	4.58	.725032	7.03
14	.523618	4.70	.700080	7.05	14	.540354	4.60	.725454	7.05
15	9.523900	4.70	9.700503	7.07	15	9.540630	4.60	9.725877	7.03
16	.524182	4.70	.700927	7.05	16	.540906	4.58	.726299	7.03
17	.524464	4.70	.701350	7.07	17	.541181	4.58	.726721	7.03
18	.524746	4.70	.701774	7.07	18	.541456	4.60	.727143	7.03
19	.525028	4.68	.702198	7.05	19	.541732	4.58	.727565	7.05
20	9.525309	4.70	9.702621	7.07	20	9.542007	4.58	9.727988	7.03
21	.525591	4.68	.703045	7.05	21	.542282	4.58	.728410	7.03
22	.525872	4.68	.703468	7.05	22	.542557	4.58	.728832	7.03
23	.526153	4.70	.703891	7.07	23	.542832	4.57	.729254	7.03
24	.526435	4.68	.704315	7.05	24	.543106	4.58	.729676	7.03
25	9.526716	4.68	9.704738	7.07	25	9.543381	4.57	9.730098	7.03
26	.526997	4.67	.705162	7.05	26	.543655	4.58	.730520	7.03
27	.527277	4.68	.705585	7.05	27	.543930	4.57	.730942	7.03
28	.527558	4.68	.706008	7.05	28	.544204	4.57	.731364	7.03
29	.527839	4.67	.706431	7.07	29	.544478	4.57	.731786	7.03
30	9.528119	4.68	9.706855	7.05	30	9.544752	4.57	9.732208	7.03
31	.528400	4.67	.707278	7.05	31	.545026	4.57	.732630	7.03
32	.528680	4.67	.707701	7.05	32	.545300	4.57	.733052	7.03
33	.528960	4.67	.708124	7.05	33	.545574	4.57	.733474	7.03
34	.529240	4.67	.708547	7.07	34	.545848	4.55	.733896	7.02
35	9.529520	4.67	9.708971	7.05	35	9.546121	4.57	9.734317	7.03
36	.529800	4.67	.709394	7.05	36	.546395	4.55	.734739	7.03
37	.530080	4.65	.709817	7.05	37	.546668	4.55	.735161	7.03
38	.530359	4.67	.710240	7.05	38	.546941	4.55	.735583	7.03
39	.530639	4.65	.710663	7.05	39	.547214	4.55	.736005	7.03
40	9.530918	4.67	9.711086	7.05	40	9.547487	4.55	9.736427	7.02
41	.531198	4.65	.711509	7.05	41	.547760	4.55	.736848	7.03
42	.531477	4.65	.711932	7.05	42	.548033	4.55	.737270	7.03
43	.531756	4.65	.712355	7.05	43	.548306	4.55	.737692	7.03
44	.532035	4.65	.712778	7.03	44	.548579	4.53	.738114	7.02
45	9.532314	4.63	9.713200	7.05	45	9.548851	4.55	9.738535	7.03
46	.532592	4.65	.713623	7.05	46	.549124	4.53	.738957	7.03
47	.532871	4.65	.714046	7.05	47	.549396	4.53	.739379	7.02
48	.533150	4.63	.714469	7.05	48	.549668	4.53	.739800	7.03
49	.533428	4.63	.714892	7.05	49	.549940	4.53	.740222	7.03
50	9.533706	4.65	9.715315	7.03	50	9.550212	4.53	9.740644	7.02
51	.533985	4.63	.715737	7.05	51	.550484	4.53	.741065	7.03
52	.534263	4.63	.716160	7.05	52	.550756	4.53	.741487	7.02
53	.534541	4.63	.716583	7.03	53	.551028	4.52	.741908	7.03
54	.534819	4.63	.717005	7.05	54	.551299	4.53	.742330	7.02
55	9.535097	4.62	9.717428	7.05	55	9.551571	4.52	9.742751	7.03
56	.535374	4.63	.717851	7.03	56	.551842	4.52	.743173	7.03
57	.535652	4.62	.718273	7.05	57	.552113	4.52	.743595	7.02
58	.535929	4.63	.718696	7.03	58	.552384	4.53	.744016	7.03
59	.536207	4.62	.719118	7.05	59	.552656	4.52	.744438	7.02
60	9.536484		9.719541		60	9.552927		9.744859	

50°					51°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.552927	4.50	9.744859	7.02	0	9.568999	4.42	9.770127	7.02
1	.553197	4.52	.745280	7.03	1	.569264	4.40	.770548	7.02
2	.553468	4.52	.745702	7.02	2	.569528	4.42	.770969	7.00
3	.553739	4.50	.746123	7.03	3	.569793	4.40	.771389	7.02
4	.554009	4.52	.746545	7.02	4	.570057	4.42	.771810	7.02
5	9.554280	4.50	9.746966	7.03	5	9.570322	4.40	9.772231	7.02
6	.554550	4.50	.747388	7.02	6	.570586	4.40	.772652	7.02
7	.554820	4.52	.747809	7.02	7	.570850	4.40	.773073	7.02
8	.555091	4.50	.748230	7.03	8	.571114	4.40	.773494	7.00
9	.555361	4.50	.748652	7.02	9	.571378	4.40	.773914	7.02
10	9.555631	4.48	9.749073	7.02	10	9.571642	4.40	9.774335	7.02
11	.555900	4.50	.749494	7.03	11	.571906	4.40	.774756	7.02
12	.556170	4.50	.749916	7.02	12	.572170	4.40	.775177	7.02
13	.556440	4.48	.750337	7.02	13	.572434	4.38	.775598	7.00
14	.556709	4.50	.750758	7.03	14	.572697	4.38	.776018	7.02
15	9.556979	4.48	9.751180	7.02	15	9.572960	4.40	9.776439	7.02
16	.557248	4.48	.751601	7.02	16	.573224	4.38	.776860	7.02
17	.557517	4.48	.752022	7.02	17	.573487	4.38	.777281	7.02
18	.557786	4.48	.752443	7.03	18	.573750	4.38	.777702	7.00
19	.558055	4.48	.752865	7.02	19	.574013	4.38	.778122	7.02
20	9.558324	4.48	9.753286	7.02	20	9.574276	4.38	9.778543	7.02
21	.558593	4.48	.753707	7.02	21	.574539	4.38	.778964	7.02
22	.558862	4.48	.754128	7.02	22	.574802	4.37	.779385	7.00
23	.559131	4.47	.754549	7.03	23	.575064	4.38	.779805	7.02
24	.559399	4.47	.754971	7.02	24	.575327	4.37	.780226	7.02
25	9.559667	4.48	9.755392	7.02	25	9.575589	4.38	9.780647	7.02
26	.559936	4.47	.755813	7.02	26	.575852	4.37	.781068	7.00
27	.560204	4.47	.756234	7.02	27	.576114	4.37	.781488	7.02
28	.560472	4.47	.756655	7.02	28	.576376	4.37	.781909	7.02
29	.560740	4.47	.757076	7.03	29	.576638	4.37	.782330	7.02
30	9.561008	4.47	9.757498	7.02	30	9.576900	4.37	9.782751	7.00
31	.561276	4.47	.757919	7.02	31	.577162	4.37	.783171	7.02
32	.561544	4.45	.758340	7.02	32	.577424	4.35	.783592	7.02
33	.561811	4.47	.758761	7.02	33	.577685	4.37	.784013	7.00
34	.562079	4.45	.759182	7.02	34	.577947	4.35	.784433	7.02
35	9.562346	4.45	9.759603	7.02	35	9.578208	4.37	9.784854	7.02
36	.562613	4.47	.760024	7.02	36	.578470	4.35	.785275	7.02
37	.562881	4.45	.760445	7.02	37	.578731	4.35	.785696	7.00
38	.563148	4.45	.760866	7.02	38	.578992	4.35	.786116	7.02
39	.563415	4.45	.761287	7.02	39	.579253	4.35	.786537	7.02
40	9.563682	4.43	9.761708	7.02	40	9.579514	4.35	9.786958	7.00
41	.563948	4.45	.762129	7.02	41	.579775	4.35	.787378	7.02
42	.564215	4.45	.762550	7.02	42	.580036	4.35	.787799	7.02
43	.564482	4.43	.762971	7.02	43	.580297	4.33	.788220	7.02
44	.564748	4.45	.763392	7.02	44	.580557	4.35	.788641	7.00
45	9.565015	4.43	9.763813	7.02	45	9.580818	4.33	9.789061	7.02
46	.565281	4.43	.764234	7.02	46	.581078	4.35	.789482	7.02
47	.565547	4.43	.764655	7.02	47	.581339	4.33	.789903	7.00
48	.565813	4.43	.765076	7.02	48	.581599	4.33	.790323	7.02
49	.566079	4.43	.765497	7.02	49	.581859	4.33	.790744	7.02
50	9.566345	4.43	9.765918	7.02	50	9.582119	4.33	9.791165	7.02
51	.566611	4.43	.766339	7.02	51	.582379	4.33	.791586	7.00
52	.566877	4.42	.766760	7.02	52	.582639	4.32	.792006	7.02
53	.567142	4.43	.767181	7.02	53	.582898	4.33	.792427	7.02
54	.567408	4.42	.767602	7.00	54	.583158	4.33	.792848	7.00
55	9.567673	4.42	9.768022	7.02	55	9.583418	4.32	9.793268	7.02
56	.567938	4.43	.768443	7.02	56	.583677	4.32	.793689	7.02
57	.568204	4.42	.768864	7.02	57	.583936	4.33	.794110	7.02
58	.568469	4.42	.769285	7.02	58	.584196	4.32	.794531	7.00
59	.568734	4.42	.769706	7.02	59	.584455	4.32	.794951	7.02
60	9.568999		9.770127		60	9.584714		9.795372	

TABLE XV.—LOGARITHMIC VERSED SINES

52°					53°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.584714	4.32	9.795372	7.02	0	9.600085	4.22	9.820622	7.02
1	.584973	4.32	.795793	7.00	1	.600338	4.22	.821043	7.02
2	.585232	4.32	.796213	7.02	2	.600591	4.23	.821464	7.02
3	.585491	4.30	.796634	7.02	3	.600845	4.22	.821885	7.02
4	.585749	4.32	.797055	7.02	4	.601098	4.22	.822306	7.02
5	9.586008	4.30	9.797476	7.00	5	9.601351	4.20	9.822727	7.02
6	.586266	4.32	.797896	7.02	6	.601603	4.22	.823148	7.02
7	.586525	4.30	.798317	7.02	7	.601856	4.22	.823569	7.02
8	.586783	4.30	.798738	7.00	8	.602109	4.22	.823990	7.02
9	.587041	4.30	.799158	7.02	9	.602362	4.20	.824411	7.03
10	9.587299	4.30	9.799579	7.02	10	9.602614	4.20	9.824833	7.02
11	.587557	4.30	.800000	7.02	11	.602866	4.22	.825254	7.02
12	.587815	4.30	.800421	7.00	12	.603119	4.20	.825675	7.02
13	.588073	4.30	.800841	7.02	13	.603371	4.20	.826096	7.02
14	.588331	4.28	.801262	7.02	14	.603623	4.20	.826517	7.02
15	9.588588	4.30	9.801683	7.02	15	9.603875	4.20	9.826938	7.03
16	.588846	4.28	.802104	7.00	16	.604127	4.20	.827360	7.02
17	.589103	4.30	.802524	7.02	17	.604379	4.20	.827781	7.02
18	.589361	4.28	.802945	7.02	18	.604631	4.20	.828202	7.02
19	.589618	4.28	.803366	7.02	19	.604883	4.18	.828623	7.02
20	9.589875	4.28	9.803787	7.00	20	9.605134	4.20	9.829044	7.03
21	.590132	4.28	.804207	7.02	21	.605386	4.18	.829466	7.02
22	.590389	4.28	.804628	7.02	22	.605637	4.18	.829887	7.02
23	.590646	4.28	.805049	7.02	23	.605888	4.20	.830308	7.02
24	.590903	4.28	.805470	7.02	24	.606140	4.18	.830729	7.03
25	9.591160	4.27	9.805891	7.00	25	9.606391	4.18	9.831151	7.02
26	.591416	4.28	.806311	7.02	26	.606642	4.18	.831572	7.02
27	.591673	4.27	.806732	7.02	27	.606893	4.18	.831993	7.03
28	.591929	4.27	.807153	7.02	28	.607144	4.17	.832415	7.02
29	.592185	4.28	.807574	7.02	29	.607394	4.18	.832836	7.02
30	9.592442	4.27	9.807995	7.00	30	9.607645	4.18	9.833257	7.03
31	.592698	4.27	.808415	7.02	31	.607896	4.17	.833679	7.02
32	.592954	4.27	.808836	7.02	32	.608146	4.18	.834100	7.03
33	.593210	4.27	.809257	7.02	33	.608397	4.17	.834522	7.02
34	.593466	4.25	.809678	7.02	34	.608647	4.17	.834943	7.02
35	9.593721	4.27	9.810099	7.02	35	9.608897	4.17	9.835364	7.03
36	.593977	4.27	.810520	7.00	36	.609147	4.17	.835786	7.02
37	.594233	4.25	.810940	7.02	37	.609397	4.17	.836207	7.03
38	.594488	4.25	.811361	7.02	38	.609647	4.17	.836629	7.02
39	.594743	4.27	.811782	7.02	39	.609897	4.17	.837050	7.03
40	9.594999	4.25	9.812203	7.02	40	9.610147	4.17	9.837472	7.02
41	.595254	4.25	.812624	7.02	41	.610397	4.15	.837893	7.03
42	.595509	4.25	.813045	7.02	42	.610646	4.17	.838315	7.02
43	.595764	4.25	.813466	7.00	43	.610896	4.15	.838736	7.03
44	.596019	4.25	.813886	7.02	44	.611145	4.15	.839158	7.02
45	9.596274	4.23	9.814307	7.02	45	9.611394	4.17	9.839579	7.03
46	.596528	4.25	.814728	7.02	46	.611644	4.15	.840001	7.03
47	.596783	4.25	.815149	7.02	47	.611893	4.15	.840423	7.02
48	.597038	4.23	.815570	7.02	48	.612142	4.15	.840844	7.03
49	.597292	4.23	.815991	7.02	49	.612391	4.15	.841266	7.02
50	9.597546	4.25	9.816412	7.02	50	9.612640	4.13	9.841687	7.03
51	.597801	4.23	.816833	7.02	51	.612888	4.15	.842109	7.03
52	.598055	4.23	.817254	7.02	52	.613137	4.15	.842531	7.03
53	.598309	4.23	.817675	7.02	53	.613386	4.13	.842953	7.02
54	.598563	4.23	.818096	7.02	54	.613634	4.15	.843374	7.03
55	9.598817	4.23	9.818517	7.02	55	9.613883	4.13	9.843796	7.03
56	.599071	4.22	.818938	7.02	56	.614131	4.13	.844218	7.02
57	.599324	4.23	.819359	7.02	57	.614379	4.13	.844639	7.03
58	.599578	4.22	.819780	7.02	58	.614627	4.15	.845061	7.03
59	.599831	4.23	.820201	7.02	59	.614876	4.13	.845483	7.02
60	9.600085		9.820622		60	9.615124		9.845905	

54°					55°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″
0	9.615124	4.12	9.845905	7.03	0	9.629841	4.05	9.871250	7.05
1	.615371	4.13	.846327	7.03	1	.630084	4.03	.871673	7.05
2	.615619	4.13	.846749	7.02	2	.630326	4.05	.872096	7.05
3	.615867	4.13	.847170	7.03	3	.630569	4.03	.872519	7.05
4	.616115	4.12	.847592	7.03	4	.630811	4.05	.872942	7.07
5	9.616362	4.13	9.848014	7.03	5	9.631054	4.03	9.873366	7.05
6	.616610	4.12	.848436	7.03	6	.631296	4.03	.873789	7.05
7	.616857	4.12	.848858	7.03	7	.631538	4.03	.874212	7.07
8	.617104	4.12	.849280	7.03	8	.631780	4.03	.874636	7.05
9	.617351	4.12	.849702	7.03	9	.632022	4.03	.875059	7.05
10	9.617598	4.12	9.850124	7.03	10	9.632264	4.02	9.875482	7.07
11	.617845	4.12	.850546	7.03	11	.632505	4.03	.875906	7.05
12	.618092	4.12	.850968	7.03	12	.632747	4.03	.876329	7.05
13	.618339	4.12	.851390	7.03	13	.632989	4.02	.876752	7.07
14	.618586	4.12	.851812	7.03	14	.633230	4.03	.877176	7.05
15	9.618833	4.10	9.852234	7.03	15	9.633472	4.02	9.877599	7.07
16	.619079	4.12	.852656	7.03	16	.633713	4.02	.878023	7.05
17	.619326	4.10	.853078	7.03	17	.633954	4.03	.878446	7.07
18	.619572	4.10	.853500	7.05	18	.634196	4.02	.878870	7.07
19	.619818	4.12	.853923	7.03	19	.634437	4.02	.879294	7.05
20	9.620065	4.10	9.854345	7.03	20	9.634678	4.02	9.879717	7.07
21	.620311	4.10	.854767	7.03	21	.634919	4.00	.880141	7.07
22	.620557	4.10	.855189	7.05	22	.635159	4.02	.880565	7.05
23	.620803	4.08	.855612	7.03	23	.635400	4.02	.880988	7.07
24	.621048	4.10	.856034	7.03	24	.635641	4.00	.881412	7.07
25	9.621294	4.10	9.856456	7.03	25	9.635881	4.02	9.881836	7.07
26	.621540	4.10	.856878	7.05	26	.636122	4.00	.882260	7.05
27	.621786	4.08	.857301	7.03	27	.636362	4.02	.882683	7.07
28	.622031	4.08	.857723	7.03	28	.636603	4.00	.883107	7.07
29	.622276	4.10	.858145	7.05	29	.636843	4.00	.883531	7.07
30	9.622522	4.08	9.858568	7.03	30	9.637083	4.00	9.883955	7.07
31	.622767	4.08	.858990	7.05	31	.637323	4.00	.884379	7.07
32	.623012	4.08	.859413	7.03	32	.637563	4.00	.884803	7.07
33	.623257	4.08	.859835	7.05	33	.637803	4.00	.885227	7.07
34	.623502	4.08	.860258	7.03	34	.638043	4.00	.885651	7.07
35	9.623747	4.08	9.860680	7.05	35	9.638283	3.98	9.886075	7.07
36	.623992	4.08	.861103	7.03	36	.638522	4.00	.886499	7.07
37	.624237	4.07	.861525	7.05	37	.638762	3.98	.886923	7.07
38	.624481	4.08	.861948	7.03	38	.639001	4.00	.887347	7.08
39	.624726	4.07	.862370	7.05	39	.639241	3.98	.887772	7.07
40	9.624970	4.08	9.862793	7.03	40	9.639480	3.98	9.888196	7.07
41	.625215	4.07	.863215	7.05	41	.639719	3.98	.888620	7.07
42	.625459	4.07	.863638	7.05	42	.639958	3.98	.889044	7.08
43	.625703	4.07	.864061	7.03	43	.640197	3.98	.889469	7.07
44	.625947	4.07	.864483	7.05	44	.640436	3.98	.889893	7.07
45	9.626191	4.07	9.864906	7.05	45	9.640675	3.98	9.890317	7.08
46	.626435	4.07	.865329	7.05	46	.640914	3.98	.890742	7.07
47	.626679	4.07	.865752	7.03	47	.641153	3.97	.891166	7.08
48	.626923	4.05	.866174	7.05	48	.641391	3.98	.891591	7.07
49	.627166	4.07	.866597	7.05	49	.641630	3.97	.892015	7.08
50	9.627410	4.07	9.867020	7.05	50	9.641868	3.98	9.892440	7.07
51	.627654	4.05	.867443	7.05	51	.642107	3.97	.892864	7.08
52	.627897	4.05	.867866	7.05	52	.642345	3.97	.893289	7.08
53	.628140	4.07	.868289	7.05	53	.642583	3.98	.893714	7.07
54	.628384	4.05	.868712	7.05	54	.642822	3.97	.894138	7.08
55	9.628627	4.05	9.869135	7.05	55	9.643060	3.97	9.894563	7.08
56	.628870	4.05	.869558	7.05	56	.643298	3.95	.894988	7.07
57	.629113	4.05	.869981	7.05	57	.643535	3.97	.895412	7.08
58	.629356	4.03	.870404	7.05	58	.643773	3.97	.895837	7.08
59	.629598	4.05	.870827	7.05	59	.644011	3.97	.896262	7.08
60	9.629841		9.871250		60	9.644249		9.896687	

TABLE XV.—LOGARITHMIC VERSED SINES

56°					57°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.644249	3.95	9.896687	7.08	0	9.658356	3.87	9.922247	7.12
1	.644486	3.97	.897112	7.08	1	.658588	3.88	.922674	7.13
2	.644724	3.95	.897537	7.08	2	.658821	3.87	.923102	7.12
3	.644961	3.95	.897962	7.08	3	.659053	3.88	.923529	7.12
4	.645198	3.97	.898387	7.08	4	.659286	3.87	.923956	7.13
5	9.645436	3.95	9.898812	7.08	5	9.659518	3.87	9.924384	7.12
6	.645673	3.95	.899237	7.08	6	.659750	3.88	.924811	7.13
7	.645910	3.95	.899662	7.08	7	.659983	3.87	.925239	7.12
8	.646147	3.95	.900087	7.08	8	.660215	3.87	.925666	7.13
9	.646384	3.93	.900512	7.10	9	.660447	3.87	.926094	7.12
10	9.646620	3.95	9.900938	7.08	10	9.660679	3.85	9.926521	7.13
11	.646857	3.95	.901363	7.08	11	.660910	3.87	.926949	7.13
12	.647094	3.93	.901788	7.08	12	.661142	3.87	.927377	7.12
13	.647330	3.95	.902213	7.10	13	.661374	3.85	.927804	7.13
14	.647567	3.93	.902639	7.08	14	.661605	3.87	.928232	7.13
15	9.647803	3.93	9.903064	7.10	15	9.661837	3.85	9.928660	7.13
16	.648039	3.95	.903490	7.08	16	.662068	3.87	.929088	7.13
17	.648276	3.93	.903915	7.10	17	.662300	3.85	.929516	7.13
18	.648512	3.93	.904341	7.08	18	.662531	3.85	.929944	7.13
19	.648748	3.93	.904766	7.10	19	.662762	3.85	.930372	7.13
20	9.648984	3.93	9.905192	7.08	20	9.662993	3.85	9.930800	7.13
21	.649220	3.93	.905617	7.10	21	.663224	3.85	.931228	7.13
22	.649456	3.92	.906043	7.10	22	.663455	3.85	.931656	7.15
23	.649691	3.93	.906469	7.08	23	.663686	3.85	.932085	7.13
24	.649927	3.93	.906894	7.10	24	.663917	3.85	.932513	7.13
25	9.650163	3.92	9.907320	7.10	25	9.664148	3.83	9.932941	7.13
26	.650398	3.92	.907746	7.10	26	.664378	3.85	.933369	7.15
27	.650633	3.93	.908172	7.10	27	.664609	3.83	.933798	7.13
28	.650869	3.92	.908598	7.10	28	.664839	3.85	.934226	7.15
29	.651104	3.92	.909024	7.10	29	.665070	3.83	.934655	7.13
30	9.651339	3.92	9.909450	7.10	30	9.665300	3.83	9.935083	7.15
31	.651574	3.92	.909876	7.10	31	.665530	3.83	.935512	7.15
32	.651809	3.92	.910302	7.10	32	.665760	3.83	.935941	7.13
33	.652044	3.92	.910728	7.10	33	.665990	3.83	.936369	7.15
34	.652279	3.92	.911154	7.10	34	.666220	3.83	.936798	7.15
35	9.652514	3.90	9.911580	7.10	35	9.666450	3.83	9.937227	7.15
36	.652748	3.92	.912006	7.10	36	.666680	3.83	.937656	7.15
37	.652983	3.90	.912432	7.12	37	.666910	3.82	.938085	7.13
38	.653217	3.92	.912859	7.10	38	.667139	3.83	.938513	7.15
39	.653452	3.90	.913285	7.10	39	.667369	3.83	.938942	7.15
40	9.653686	3.90	9.913711	7.12	40	9.667599	3.82	9.939371	7.17
41	.653920	3.92	.914138	7.10	41	.667828	3.82	.939801	7.15
42	.654155	3.90	.914564	7.12	42	.668057	3.83	.940230	7.15
43	.654389	3.90	.914991	7.10	43	.668287	3.82	.940659	7.15
44	.654623	3.90	.915417	7.12	44	.668516	3.82	.941088	7.15
45	9.654857	3.88	9.915844	7.10	45	9.668745	3.82	9.941517	7.17
46	.655090	3.90	.916270	7.12	46	.668974	3.82	.941947	7.15
47	.655324	3.90	.916697	7.12	47	.669203	3.82	.942376	7.17
48	.655558	3.90	.917124	7.10	48	.669432	3.82	.942806	7.15
49	.655792	3.88	.917550	7.12	49	.669661	3.80	.943235	7.17
50	9.656025	3.88	9.917977	7.12	50	9.669889	3.82	9.943665	7.15
51	.656258	3.90	.918404	7.12	51	.670118	3.82	.944094	7.17
52	.656492	3.88	.918831	7.12	52	.670347	3.80	.944524	7.15
53	.656725	3.88	.919258	7.12	53	.670575	3.82	.944953	7.17
54	.656958	3.88	.919685	7.12	54	.670804	3.80	.945383	7.17
55	9.657191	3.88	9.920112	7.12	55	9.671032	3.80	9.945813	7.17
56	.657424	3.88	.920539	7.12	56	.671260	3.80	.946243	7.17
57	.657657	3.88	.920966	7.12	57	.671488	3.80	.946673	7.17
58	.657890	3.88	.921393	7.12	58	.671716	3.82	.947103	7.17
59	.658123	3.88	.921820	7.12	59	.671945	3.78	.947533	7.17
60	9.658356		9.922247		60	9.672172		9.947963	

58°					59°				
M.	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″.**	**M.**	**Vers.**	**D. 1″.**	**Exsec.**	**D. 1″**
0	9.672172	3.80	9.947963	7.17	0	9.685708	3.72	9.973868	7.23
1	.672400	3.80	.948393	7.17	1	.685931	3.72	.974302	7.23
2	.672628	3.80	.948823	7.17	2	.686154	3.72	.974736	7.22
3	.672856	3.78	.949253	7.17	3	.686377	3.72	.975169	7.23
4	.673083	3.80	.949683	7.18	4	.686600	3.72	.975603	7.23
5	9.673311	3.78	9.950114	7.17	5	9.686823	3.72	9.976037	7.23
6	.673538	3.80	.950544	7.18	6	.687046	3.72	.976471	7.23
7	.673766	3.78	.950975	7.17	7	.687269	3.72	.976905	7.23
8	.673993	3.78	.951405	7.18	8	.687492	3.70	.977339	7.23
9	.674220	3.80	.951836	7.17	9	.687714	3.72	.977773	7.23
10	9.674448	3.78	9.952266	7.18	10	9.687937	3.70	9.978207	7.23
11	.674675	3.78	.952697	7.18	11	.688159	3.72	.978641	7.23
12	.674902	3.78	.953128	7.17	12	.688382	3.70	.979075	7.25
13	.675129	3.78	.953558	7.18	13	.688604	3.70	.979510	7.23
14	.675356	3.77	.953989	7.18	14	.688826	3.70	.979944	7.25
15	9.675582	3.78	9.954420	7.18	15	9.689048	3.72	9.980379	7.23
16	.675809	3.78	.954851	7.18	16	.689271	3.70	.980813	7.25
17	.676036	3.77	.955282	7.18	17	.689493	3.70	.981248	7.23
18	.676262	3.78	.955713	7.18	18	.689715	3.70	.981682	7.25
19	.676489	3.77	.956144	7.18	19	.689937	3.68	.982117	7.25
20	9.676715	3.77	9.956575	7.18	20	9.690158	3.70	9.982552	7.25
21	.676941	3.78	.957006	7.20	21	.690380	3.70	.982987	7.25
22	.677168	3.77	.957438	7.18	22	.690602	3.68	.983422	7.25
23	.677394	3.77	.957869	7.18	23	.690823	3.70	.983857	7.25
24	.677620	3.77	.958300	7.20	24	.691045	3.68	.984292	7.25
25	9.677846	3.77	9.958732	7.18	25	9.691266	3.70	9.984727	7.25
26	.678072	3.77	.959163	7.20	26	.691488	3.68	.985162	7.25
27	.678298	3.75	.959595	7.18	27	.691709	3.68	.985597	7.27
28	.678523	3.77	.960026	7.20	28	.691930	3.68	.986033	7.25
29	.678749	3.77	.960458	7.20	29	.692151	3.68	.986468	7.27
30	9.678975	3.75	9.960890	7.18	30	9.692372	3.68	9.986904	7.25
31	.679200	3.77	.961321	7.20	31	.692593	3.68	.987339	7.27
32	.679426	3.75	.961753	7.20	32	.692814	3.68	.987775	7.25
33	.679651	3.75	.962185	7.20	33	.693035	3.68	.988210	7.27
34	.679876	3.77	.962617	7.20	34	.693256	3.68	.988646	7.27
35	9.680102	3.75	9.963049	7.20	35	9.693477	3.67	9.989082	7.27
36	.680327	3.75	.963481	7.20	36	.693697	3.68	.989518	7.27
37	.680552	3.75	.963913	7.20	37	.693918	3.67	.989954	7.27
38	.680777	3.75	.964345	7.22	38	.694138	3.68	.990390	7.27
39	.681002	3.75	.964778	7.20	39	.694359	3.67	.990826	7.27
40	9.681227	3.73	9.965210	7.20	40	9.694579	3.67	9.991262	7.27
41	.681451	3.75	.965642	7.22	41	.694799	3.67	.991698	7.27
42	.681676	3.75	.966075	7.20	42	.695019	3.68	.992134	7.28
43	.681901	3.73	.966507	7.22	43	.695240	3.67	.992571	7.27
44	.682125	3.75	.966940	7.20	44	.695460	3.67	.993007	7.28
45	9.682350	3.73	9.967372	7.22	45	9 695680	3.65	9.993444	7.27
46	.682574	3.73	.967805	7.22	46	.695899	3.67	.993880	7.28
47	.682798	3.75	.968238	7.20	47	.696119	3.67	.994317	7.28
48	.683023	3.73	.968670	7.22	48	.696339	3.67	.994754	7.28
49	.683247	3.73	.969103	7.22	49	.696559	3.65	.995191	7.27
50	9.683471	3.73	9.969536	7.22	50	9.696778	3.67	9.995627	7.28
51	.683695	3.73	.969969	7.22	51	.696998	3.65	.996064	7.28
52	.683919	3.73	.970402	7.22	52	.697217	3.67	.996501	7.28
53	.684143	3.73	.970835	7.22	53	.697437	3.65	.996938	7.30
54	.684367	3.72	.971268	7.22	54	.697656	3.65	.997376	7.28
55	9.684590	3.73	9.971701	7.23	55	9.697875	3.65	9.997813	7.28
56	.684814	3.72	.972135	7.22	56	.698094	3.65	.998250	7.28
57	.685037	3.73	.972568	7.22	57	.698313	3.65	.998687	7.30
58	.685261	3.72	.973001	7.23	58	.698532	3.65	.999125	7.28
59	.685484	3.73	.973435	7.22	59	.698751	3.65	.999562	7.30
60	9.685708		9.973868		60	9.698970		0.000000	

TABLE XV.—LOGARITHMIC VERSED SINES

60°					61°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	9.698970	3.65	0.000000	7.30	0	9.711968	3.57	0.026397	7.37
1	.699189	3.63	.000438	7.28	1	.712182	3.58	.026839	7.37
2	.699407	3.65	.000875	7.30	2	.712397	3.57	.027281	7.38
3	.699626	3.65	.001313	7.30	3	.712611	3.57	.027724	7.38
4	.699845	3.63	.001751	7.30	4	.712825	3.57	.028167	7.37
5	9.700063	3.65	0.002189	7.30	5	9.713039	3.57	0.028609	7.38
6	.700282	3.63	.002627	7.30	6	.713253	3.57	.029052	7.38
7	.700500	3.63	.003065	7.30	7	.713467	3.57	.029495	7.38
8	.700718	3.63	.003503	7.32	8	.713681	3.57	.029938	7.38
9	.700936	3.63	.003942	7.30	9	.713895	3.57	.030381	7.40
10	9.701154	3.63	0.004380	7.30	10	9.714109	3.57	0.030825	7.38
11	.701372	3.63	.004818	7.32	11	.714323	3.55	.031268	7.38
12	.701590	3.63	.005257	7.30	12	.714536	3.57	.031711	7.40
13	.701808	3.63	.005695	7.32	13	.714750	3.55	.032155	7.38
14	.702026	3.63	.006134	7.32	14	.714963	3.57	.032598	7.40
15	9.702244	3.63	0.006573	7.32	15	9.715177	3.55	0.033042	7.40
16	.702462	3.62	.007012	7.30	16	.715390	3.55	.033486	7.38
17	.702679	3.63	.007450	7.32	17	.715603	3.57	.033929	7.40
18	.702897	3.62	.007889	7.32	18	.715817	3.55	.034373	7.40
19	.703114	3.63	.008328	7.32	19	.716030	3.55	.034817	7.40
20	9.703332	3.62	0.008767	7.33	20	9.716243	3.55	0.035261	7.40
21	.703549	3.62	.009207	7.32	21	.716456	3.55	.035705	7.42
22	.703766	3.62	.009646	7.32	22	.716669	3.55	.036150	7.40
23	.703983	3.62	.010085	7.33	23	.716882	3.55	.036594	7.40
24	.704200	3.62	.010525	7.32	24	.717095	3.53	.037038	7.42
25	9.704417	3.62	0.010964	7.33	25	9.717307	3.55	0.037483	7.42
26	.704634	3.62	.011404	7.32	26	.717520	3.53	.037928	7.40
27	.704851	3.62	.011843	7.33	27	.717732	3.55	.038372	7.42
28	.705068	3.62	.012283	7.33	28	.717945	3.53	.038817	7.42
29	.705285	3.60	.012723	7.33	29	.718157	3.55	.039262	7.42
30	9.705501	3.62	0.013163	7.33	30	9.718370	3.53	0.039707	7.42
31	.705718	3.62	.013603	7.33	31	.718582	3.53	.040152	7.42
32	.705935	3.60	.014043	7.33	32	.718794	3.55	.040597	7.42
33	.706151	3.60	.014483	7.33	33	.719007	3.53	.041042	7.43
34	.706367	3.62	.014923	7.33	34	.719219	3.53	.041488	7.42
35	9.706584	3.60	0.015363	7.35	35	9.719431	3.53	0.041933	7.43
36	.706800	3.60	.015804	7.33	36	.719643	3.53	.042379	7.42
37	.707016	3.60	.016244	7.33	37	.719855	3.52	.042824	7.43
38	.707232	3.60	.016684	7.35	38	.720066	3.53	.043270	7.43
39	.707448	3.60	.017125	7.35	39	.720278	3.53	.043716	7.43
40	9.707664	3.60	0.017566	7.35	40	9.720490	3.52	0.044162	7.43
41	.707880	3.60	.018007	7.33	41	.720701	3.53	.044608	7.43
42	.708096	3.58	.018447	7.35	42	.720913	3.52	.045054	7.43
43	.708311	3.60	.018888	7.35	43	.721124	3.53	.045500	7.43
44	.708527	3.60	.019329	7.35	44	.721336	3.52	.045946	7.45
45	9.708743	3.58	0.019770	7.37	45	9.721547	3.52	0.046393	7.43
46	.708958	3.60	.020212	7.35	46	.721758	3.53	.046839	7.45
47	.709174	3.58	.020653	7.35	47	.721970	3.52	.047286	7.43
48	.709389	3.58	.021094	7.35	48	.722181	3.52	.047732	7.45
49	.709604	3.58	.021535	7.37	49	.722392	3.52	.048179	7.45
50	9.709819	3.60	0.021977	7.37	50	9.722603	3.52	0.048626	7.45
51	.710035	3.58	.022419	7.35	51	.722814	3.50	.049073	7.45
52	.710250	3.58	.022860	7.37	52	.723024	3.52	.049520	7.45
53	.710465	3.58	.023302	7.37	53	.723235	3.52	.049967	7.45
54	.710680	3.58	.023744	7.37	54	.723446	3.52	.050414	7.45
55	9.710895	3.57	0.024186	7.37	55	9.723657	3.50	0.050861	7.47
56	.711109	3.58	.024628	7.37	56	.723867	3.52	.051309	7.45
57	.711324	3.58	.025070	7.37	57	.724078	3.50	.051756	7.47
58	.711539	3.57	.025512	7.37	58	.724288	3.50	.052204	7.47
59	.711753	3.58	.025954	7.38	59	.724498	3.52	.052652	7.45
60	9.711968		0.026397		60	9.724709		0.053099	

62°					63°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.724709	3.50	0.053099	7.47	0	9.737200	3.43	0.080153	7.58
1	.724919	3.50	.053547	7.47	1	.737406	3.43	.080608	7.57
2	.725129	3.50	.053995	7.47	2	.737612	3.43	.081062	7.57
3	.725339	3.50	.054443	7.48	3	.737818	3.43	.081516	7.58
4	.725549	3.50	.054892	7.47	4	.738024	3.43	.081971	7.57
5	9.725759	3.50	0.055340	7.47	5	9.738230	3.43	0.082425	7.58
6	.725969	3.50	.055788	7.48	6	.738436	3.43	.082880	7.58
7	.726179	3.48	.056237	7.47	7	.738642	3.42	.083335	7.58
8	.726388	3.50	.056685	7.48	8	.738847	3.43	.083790	7.58
9	.726598	3.50	.057134	7.48	9	.739053	3.42	.084245	7.58
10	9.726808	3.48	0.057583	7.48	10	9.739258	3.43	0.084700	7.58
11	.727017	3.50	.058032	7.48	11	.739464	3.42	.085155	7.60
12	.727227	3.48	.058481	7.48	12	.739669	3.43	.085611	7.58
13	.727436	3.48	.058930	7.48	13	.739875	3.42	.086066	7.60
14	.727645	3.50	.059379	7.48	14	.740080	3.42	.086522	7.58
15	9.727855	3.48	0.059828	7.50	15	9.740285	3.42	0.086977	7.60
16	.728064	3.48	.060278	7.48	16	.740490	3.42	.087433	7.60
17	.728273	3.48	.060727	7.50	17	.740695	3.42	.087889	7.60
18	.728482	3.48	.061177	7.48	18	.740900	3.42	.088345	7.60
19	.728691	3.48	.061626	7.50	19	.741105	3.42	.088801	7.62
20	9.728900	3.48	0.062076	7.50	20	9.741310	3.42	0.089258	7.60
21	.729109	3.47	.062526	7.50	21	.741515	3.40	.089714	7.62
22	.729317	3.48	.062976	7.50	22	.741719	3.42	.090171	7.60
23	.729526	3.48	.063426	7.50	23	.741924	3.42	.090627	7.62
24	.729735	3.47	.063876	7.52	24	.742129	3.40	.091084	7.62
25	9.729943	3.48	0.064327	7.50	25	9.742333	3.42	0.091541	7.62
26	.730152	3.47	.064777	7.50	26	.742538	3.40	.091998	7.62
27	.730360	3.48	.065227	7.52	27	.742742	3.40	.092455	7.62
28	.730569	3.47	.065678	7.52	28	.742946	3.40	.092912	7.63
29	.730777	3.47	.066129	7.52	29	.743150	3.42	.093370	7.62
30	9.730985	3.47	0.066580	7.50	30	9.743355	3.40	0.093827	7.63
31	.731193	3.47	.067030	7.53	31	.743559	3.40	.094285	7.63
32	.731401	3.47	.067482	7.52	32	.743763	3.40	.094743	7.62
33	.731609	3.47	.067933	7.52	33	.743967	3.40	.095200	7.63
34	.731817	3.47	.068384	7.52	34	.744171	3.40	.095658	7.63
35	9.732025	3.47	0.068835	7.53	35	9.744375	3.38	0.096116	7.65
36	.732233	3.47	.069287	7.52	36	.744578	3.40	.096575	7.63
37	.732441	3.45	.069738	7.53	37	.744782	3.40	.097033	7.63
38	.732648	3.47	.070190	7.53	38	.744986	3.38	.097491	7.65
39	.732856	3.47	.070642	7.52	39	.745189	3.40	.097950	7.63
40	9.733064	3.45	0.071093	7.53	40	9.745393	3.38	0.098408	7.65
41	.733271	3.45	.071545	7.55	41	.745596	3.40	.098867	7.65
42	.733478	3.47	.071998	7.53	42	.745800	3.38	.099326	7.65
43	.733686	3.45	.072450	7.53	43	.746003	3.38	.099785	7.65
44	.733893	3.45	.072902	7.53	44	.746206	3.38	.100244	7.67
45	9.734100	3.45	0.073354	7.55	45	9.746409	3.40	0.100704	7.65
46	.734307	3.47	.073807	7.55	46	.746613	3.38	.101163	7.67
47	.734515	3.43	.074260	7.53	47	.746816	3.38	.101623	7.65
48	.734721	3.45	.074712	7.55	48	.747019	3.38	.102082	7.67
49	.734928	3.45	.075165	7.55	49	.747222	3.37	.102542	7.67
50	9.735135	3.45	0.075618	7.55	50	9.747424	3.38	0.103002	7.67
51	.735342	3.45	.076071	7.55	51	.747627	3.38	.103462	7.67
52	.735549	3.43	.076524	7.55	52	.747830	3.38	.103922	7.67
53	.735755	3.45	.076977	7.57	53	.748033	3.37	.104382	7.68
54	.735962	3.45	.077431	7.55	54	.748235	3.38	.104843	7.67
55	9.736169	3.43	0.077884	7.57	55	9.748438	3.37	0.105303	7.68
56	.736375	3.43	.078338	7.57	56	.748640	3.38	.105764	7.67
57	.736581	3.45	.078792	7.55	57	.748843	3.37	.106224	7.68
58	.736788	3.43	.079245	7.57	58	.749045	3.37	.106685	7.68
59	.736994	3.43	.079699	7.57	59	.749247	3.37	.107146	7.68
60	9.737200		0.080153		60	9.749449		0.107607	

TABLE XV.—LOGARITHMIC VERSED SINES

64°					65°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.749449	3.38	0.107607	7.70	0	9.761463	3.30	0.135515	7.82
1	.749652	3.37	.108069	7.68	1	.761661	3.32	.135984	7.83
2	.749854	3.37	.108530	7.70	2	.761860	3.30	.136454	7.82
3	.750056	3.37	.108992	7.68	3	.762058	3.30	.136923	7.83
4	.750258	3.35	.109453	7.70	4	.762256	3.30	.137393	7.83
5	9.750459	3.37	0.109915	7.70	5	9.762454	3.30	0.137863	7.83
6	.750661	3.37	.110377	7.70	6	.762652	3.30	.138333	7.83
7	.750863	3.37	.110839	7.70	7	.762850	3.28	.138803	7.83
8	.751065	3.35	.111301	7.70	8	.763047	3.30	.139273	7.85
9	.751266	3.37	.111763	7.72	9	.763245	3.30	.139744	7.83
10	9.751468	3.35	0.112226	7.70	10	9.763443	3.30	0.140214	7.85
11	.751669	3.37	.112688	7.72	11	.763641	3.28	.140685	7.85
12	.751871	3.35	.113151	7.72	12	.763838	3.30	.141156	7.85
13	.752072	3.35	.113614	7.72	13	.764036	3.28	.141627	7.85
14	.752273	3.37	.114077	7.72	14	.764233	3.28	.142098	7.85
15	9.752475	3.35	0.114540	7.72	15	9.764430	3.30	0.142569	7.87
16	.752676	3.35	.115003	7.72	16	.764628	3.28	.143041	7.85
17	.752877	3.35	.115466	7.72	17	.764825	3.28	.143512	7.87
18	.753078	3.35	.115929	7.73	18	.765022	3.28	.143984	7.87
19	.753279	3.35	.116393	7.73	19	.765219	3.28	.144456	7.87
20	9.753480	3.35	0.116857	7.73	20	9.765416	3.28	0.144928	7.87
21	.753681	3.33	.117321	7.73	21	.765613	3.28	.145400	7.87
22	.753881	3.35	.117785	7.73	22	.765810	3.28	.145872	7.88
23	.754082	3.35	.118249	7.73	23	.766007	3.28	.146345	7.88
24	.754283	3.33	.118713	7.73	24	.766204	3.28	.146818	7.87
25	9.754483	3.35	0.119177	7.75	25	9.766401	3.27	0.147290	7.88
26	.754684	3.33	.119642	7.73	26	.766597	3.28	.147763	7.88
27	.754884	3.35	.120106	7.75	27	.766794	3.28	.148236	7.90
28	.755085	3.33	.120571	7.75	28	.766991	3.27	.148710	7.88
29	.755285	3.33	.121036	7.75	29	.767187	3.28	.149183	7.90
30	9.755485	3.33	0.121501	7.75	30	9.767384	3.27	0.149657	7.88
31	.755685	3.35	.121966	7.75	31	.767580	3.27	.150130	7.90
32	.755886	3.33	.122431	7.77	32	.767776	3.27	.150604	7.90
33	.756086	3.33	.122897	7.75	33	.767972	3.28	.151078	7.90
34	.756286	3.33	.123362	7.77	34	.768169	3.27	.151552	7.92
35	9.756486	3.32	0.123828	7.77	35	9.768365	3.27	0.152027	7.90
36	.756685	3.33	.124294	7.77	36	.768561	3.27	.152501	7.92
37	.756885	3.33	.124760	7.77	37	.768757	3.27	.152976	7.90
38	.757085	3.33	.125226	7.77	38	.768953	3.27	.153450	7.92
39	.757285	3.32	.125692	7.77	39	.769149	3.25	.153925	7.92
40	9.757484	3.33	0.126158	7.78	40	9.769344	3.27	0.154400	7.93
41	.757684	3.32	.126625	7.78	41	.769540	3.27	.154876	7.92
42	.757883	3.33	.127092	7.77	42	.769736	3.25	.155351	7.92
43	.758083	3.32	.127558	7.78	43	.769931	3.27	.155826	7.93
44	.758282	3.32	.128025	7.78	44	.770127	3.27	.156302	7.93
45	9.758481	3.33	0.128492	7.80	45	9.770323	3.25	0.156778	7.93
46	.758681	3.32	.128960	7.78	46	.770518	3.25	.157254	7.93
47	.758880	3.32	.129427	7.78	47	.770713	3.27	.157730	7.93
48	.759079	3.32	.129894	7.80	48	.770909	3.25	.158206	7.95
49	.759278	3.32	.130362	7.80	49	.771104	3.25	.158683	7.93
50	9.759477	3.32	0.130830	7.80	50	9.771299	3.25	0.159159	7.95
51	.759676	3.32	.131298	7.80	51	.771494	3.25	.159636	7.95
52	.759875	3.30	.131766	7.80	52	.771689	3.25	.160113	7.95
53	.760073	3.32	.132234	7.80	53	.771884	3.25	.160590	7.95
54	.760272	3.32	.132702	7.80	54	.772079	3.25	.161067	7.97
55	9.760471	3.30	0.133170	7.82	55	9.772274	3.25	0.161545	7.95
56	.760669	3.32	.133639	7.82	56	.772469	3.25	.162022	7.97
57	.760868	3.30	.134108	7.82	57	.772664	3.23	.162500	7.97
58	.761066	3.32	.134577	7.82	58	.772858	3.25	.162978	7.97
59	.761265	3.30	.135046	7.82	59	.773053	3.25	.163456	7.97
60	9.761463		0.135515		60	9.773248		0.163934	

66°					67°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.773248	3.23	0.163934	7.98	0	9.784809	3.18	0.192931	8.15
1	.773442	3.23	.164413	7.97	1	.785000	3.18	.193420	8.13
2	.773636	3.25	.164891	7.98	2	.785191	3.17	.193908	8.15
3	.773831	3.23	.165370	7.98	3	.785381	3.18	.194397	8.15
4	.774025	3.23	.165849	7.98	4	.785572	3.18	.194886	8.17
5	9.774219	3.25	0.166328	7.98	5	9.785763	3.17	0.195376	8.15
6	.774414	3.23	.166807	7.98	6	.785953	3.18	.195865	8.17
7	.774608	3.23	.167286	8.00	7	.786144	3.17	.196355	8.17
8	.774802	3.23	.167766	7.98	8	.786334	3.17	.196845	8.17
9	.774996	3.23	.168245	8.00	9	.786524	3.18	.197335	8.17
10	9.775190	3.23	0.168725	8.00	10	9.786715	3.17	0.197825	8.17
11	.775384	3.22	.169205	8.00	11	.786905	3.17	.198315	8.18
12	.775577	3.23	.169685	8.00	12	.787095	3.17	.198806	8.18
13	.775771	3.23	.170165	8.02	13	.787285	3.17	.199297	8.18
14	.775965	3.23	.170646	8.02	14	.787475	3.17	.199788	8.18
15	9.776159	3.22	0.171127	8.00	15	9.787665	3.17	0.200279	8.18
16	.776352	3.23	.171607	8.02	16	.787855	3.17	.200770	8.20
17	.776546	3.22	.172088	8.02	17	.788045	3.17	.201262	8.18
18	.776739	3.23	.172569	8.03	18	.788235	3.17	.201753	8.20
19	.776933	3.22	.173051	8.02	19	.788425	3.15	.202245	8.20
20	9.777126	3.22	0.173532	8.03	20	9.788614	3.17	0.202737	8.20
21	.777319	3.22	.174014	8.03	21	.788804	3.15	.203229	8.22
22	.777512	3.22	.174496	8.03	22	.788993	3.17	.203722	8.22
23	.777705	3.23	.174978	8.03	23	.789183	3.15	.204215	8.20
24	.777899	3.22	.175460	8.03	24	.789372	3.17	.204707	8.22
25	9.778092	3.22	0.175942	8.05	25	9.789562	3.15	0.205200	8.23
26	.778285	3.20	.176425	8.03	26	.789751	3.15	.205694	8.22
27	.778477	3.22	.176907	8.05	27	.789940	3.17	.206187	8.23
28	.778670	3.22	.177390	8.05	28	.790130	3.15	.206681	8.22
29	.778863	3.22	.177873	8.05	29	.790319	3.15	.207174	8.23
30	9.779056	3.20	0.178356	8.05	30	9.790508	3.15	0.207668	8.23
31	.779248	3.22	.178839	8.07	31	.790697	3.15	.208162	8.25
32	.779441	3.22	.179323	8.07	32	.790886	3.15	.208657	8.23
33	.779634	3.20	.179807	8.05	33	.791075	3.15	.209151	8.25
34	.779826	3.20	.180290	8.07	34	.791264	3.15	.209646	8.25
35	9.780018	3.22	0.180774	8.08	35	9.791453	3.13	0.210141	8.25
36	.780211	3.20	.181259	8.07	36	.791641	3.15	.210636	8.25
37	.780403	3.20	.181743	8.07	37	.791830	3.15	.211131	8.27
38	.780595	3.20	.182227	8.08	38	.792019	3.13	.211627	8.27
39	.780787	3.22	.182712	8.08	39	.792207	3.15	.212123	8.25
40	9.780980	3.20	0.183197	8.08	40	9.792396	3.13	0.212618	8.28
41	.781172	3.20	.183682	8.08	41	.792584	3.13	.213115	8.27
42	.781364	3.20	.184167	8.10	42	.792772	3.15	.213611	8.27
43	.781556	3.18	.184653	8.08	43	.792961	3.13	.214107	8.28
44	.781747	3.20	.185138	8.10	44	.793149	3.13	.214604	8.28
45	9.781939	3.20	0.185624	8.10	45	9.793337	3.13	0.215101	8.28
46	.782131	3.20	.186110	8.10	46	.793525	3.15	.215598	8.28
47	.782323	3.18	.186596	8.10	47	.793714	3.13	.216095	8.30
48	.782514	3.20	.187082	8.10	48	.793902	3.13	.216593	8.28
49	.782706	3.18	.187568	8.12	49	.794090	3.12	.217090	8.30
50	9.782897	3.20	0.188055	8.12	50	9.794277	3.13	0.217588	8.30
51	.783089	3.18	.188542	8.12	51	.794465	3.13	.218086	8.32
52	.783280	3.18	.189029	8.12	52	.794653	3.13	.218585	8.30
53	.783471	3.20	.189516	8.12	53	.794841	3.12	.219083	8.32
54	.783663	3.18	.190003	8.13	54	.795028	3.13	.219582	8.32
55	9.783854	3.18	0.190491	8.12	55	9.795216	3.13	0.220081	8.32
56	.784045	3.18	.190978	8.13	56	.795404	3.12	.220580	8.32
57	.784236	3.18	.191466	8.13	57	.795591	3.13	.221079	8.32
58	.784427	3.18	.191954	8.15	58	.795779	3.12	.221578	8.33
59	.784618	3.18	.192443	8.13	59	.795966	3.12	.222078	8.33
60	9.784809		0.192931		60	9.796153		0.222578	

TABLE XV.—LOGARITHMIC VERSED SINES

	68°					69°			
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.796153	3.13	0.222578	8.33	0	9.807286	3.07	0.252957	8.55
1	.796341	3.12	.223078	8.33	1	.807470	3.07	.253470	8.55
2	.796528	3.12	.223578	8.35	2	.807654	3.05	.253983	8.57
3	.796715	3.12	.224079	8.33	3	.807837	3.07	.254497	8.55
4	.796902	3.12	.224579	8.35	4	.808021	3.05	.255010	8.57
5	9.797089	3.12	0.225080	8.35	5	9.808204	3.07	0.255524	8.58
6	.797276	3.12	.225581	8.37	6	.808388	3.05	.256039	8.57
7	.797463	3.12	.226083	8.35	7	.808571	3.07	.256553	8.58
8	.797650	3.12	.226584	8.37	8	.808755	3.05	.257068	8.57
9	.797837	3.10	.227086	8.37	9	.808938	3.05	.257582	8.60
10	9.798023	3.12	0.227588	8.37	10	9.809121	3.07	0.258098	8.58
11	.798210	3.12	.228090	8.37	11	.809305	3.05	.258613	8.60
12	.798397	3.10	.228592	8.38	12	.809488	3.05	.259129	8.58
13	.798583	3.12	.229095	8.38	13	.809671	3.05	.259644	8.60
14	.798770	3.10	.229598	8.38	14	.809854	3.05	.260160	8.62
15	9.798956	3.10	0.230101	8.38	15	9.810037	3.05	0.260677	8.60
16	.799142	3.12	.230604	8.38	16	.810220	3.05	.261193	8.62
17	.799329	3.10	.231107	8.40	17	.810403	3.03	.261710	8.62
18	.799515	3.10	.231611	8.40	18	.810585	3.05	.262227	8.62
19	.799701	3.10	.232115	8.40	19	.810768	3.05	.262744	8.63
20	9.799887	3.12	0.232619	8.40	20	9.810951	3.05	0.263262	8.62
21	.800074	3.10	.233123	8.40	21	.811134	3.03	.263779	8.63
22	.800260	3.10	.233627	8.42	22	.811316	3.05	.264297	8.63
23	.800446	3.08	.234132	8.42	23	.811499	3.03	.264815	8.65
24	.800631	3.10	.234637	8.42	24	.811681	3.05	.265334	8.65
25	9.800817	3.10	0.235142	8.42	25	9.811864	3.03	0.265853	8.63
26	.801003	3.10	.235647	8.43	26	.812046	3.03	.266371	8.67
27	.801189	3.10	.236153	8.42	27	.812228	3.03	.266891	8.65
28	.801375	3.08	.236658	8.43	28	.812410	3.05	.267410	8.67
29	.801560	3.10	.237164	8.43	29	.812593	3.03	.267930	8.65
30	9.801746	3.08	0.237670	8.45	30	9.812775	3.03	0.268449	8.68
31	.801931	3.10	.238177	8.43	31	.812957	3.03	.268970	8.67
32	.802117	3.08	.238683	8.45	32	.813139	3.03	.269490	8.68
33	.802302	3.08	.239190	8.45	33	.813321	3.03	.270011	8.67
34	.802487	3.10	.239697	8.45	34	.813503	3.03	.270531	8.68
35	9.802673	3.08	0.240204	8.47	35	9.813685	3.02	0.271052	8.70
36	.802858	3.08	.240712	8.45	36	.813866	3.03	.271574	8.68
37	.803043	3.08	.241219	8.47	37	.814048	3.03	.272095	8.70
38	.803228	3.08	.241727	8.47	38	.814230	3.02	.272617	8.70
39	.803413	3.08	.242235	8.48	39	.814411	3.03	.273139	8.72
40	9.803598	3.08	0.242744	8.47	40	9.814593	3.03	0.273662	8.70
41	.803783	3.08	.243252	8.48	41	.814775	3.02	.274184	8.72
42	.803968	3.08	.243761	8.48	42	.814956	3.02	.274707	8.72
43	.804153	3.08	.244270	8.48	43	.815137	3.03	.275230	8.72
44	.804338	3.07	.244779	8.50	44	.815319	3.02	.275753	8.73
45	9.804522	3.08	0.245289	8.48	45	9.815500	3.02	0.276277	8.73
46	.804707	3.08	.245798	8.50	46	.815681	3.02	.276801	8.73
47	.804892	3.07	.246308	8.50	47	.815862	3.03	.277325	8.73
48	.805076	3.08	.246818	8.52	48	.816044	3.02	.277849	8.75
49	.805261	3.07	.247329	8.50	49	.816225	3.02	.278374	8.75
50	9.805445	3.07	0.247839	8.52	50	9.816406	3.02	0.278899	8.75
51	.805629	3.08	.248350	8.52	51	.816587	3.00	.279424	8.75
52	.805814	3.07	.248861	8.52	52	.816767	3.02	.279949	8.77
53	.805998	3.07	.249372	8.52	53	.816948	3.02	.280475	8.75
54	.806182	3.07	.249883	8.53	54	.817129	3.02	.281000	8.78
55	9.806366	3.07	0.250395	8.53	55	9.817310	3.00	0.281527	8.77
56	.806550	3.07	.250907	8.53	56	.817490	3.02	.282053	8.78
57	.806734	3.07	.251419	8.55	57	.817671	3.02	.282580	8.77
58	.806918	3.07	.251932	8.53	58	.817852	3.00	.283106	8.80
59	.807102	3.07	.252444	8.55	59	.818032	3.02	.283634	8.78
60	9.807286		0.252957		60	9.818213		0.284161	

	70°					71°			
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.818213	3.00	0.284161	8.80	0	9.828938	2.95	0.316296	9.07
1	.818393	3.00	.284689	8.78	1	.829115	2.95	.316840	9.08
2	.818573	3.02	.285216	8.82	2	.829292	2.95	.317385	9.07
3	.818754	3.00	.285745	8.80	3	.829469	2.95	.317929	9.10
4	.818934	3.00	.286273	8.82	4	.829646	2.95	.318475	9.08
5	9.819114	3.00	0.286802	8.82	5	9.829823	2.95	0.319020	9.08
6	.819294	3.00	.287331	8.82	6	.830000	2.95	.319565	9.10
7	.819474	3.00	.287860	8.82	7	.830177	2.93	.320111	9.12
8	.819654	3.00	.288389	8.83	8	.830353	2.95	.320658	9.10
9	.819834	3.00	.288919	8.83	9	.830530	2.93	.321204	9.12
10	9.820014	3.00	0.289449	8.83	10	9.830706	2.95	0.321751	9.12
11	.820194	3.00	.289979	8.85	11	.830883	2.93	.322298	9.12
12	.820374	2.98	.290510	8.85	12	.831059	2.95	.322845	9.13
13	.820553	3.00	.291041	8.85	13	.831236	2.93	.323393	9.13
14	.820733	3.00	.291572	8.85	14	.831412	2.95	.323941	9.13
15	9.820913	2.98	0.292103	8.87	15	9.831589	2.93	0.324489	9.15
16	.821092	3.00	.292635	8.85	16	.831765	2.93	.325038	9.15
17	.821272	2.98	.293166	8.87	17	.831941	2.93	.325587	9.15
18	.821451	3.00	.293698	8.88	18	.832117	2.93	.326136	9.17
19	.821631	2.98	.294231	8.88	19	.832293	2.93	.326686	9.15
20	9.821810	2.98	0.294764	8.87	20	9.832469	2.93	0.327235	9.18
21	.821989	2.98	.295296	8.90	21	.832645	2.93	.327786	9.17
22	.822168	3.00	.295830	8.88	22	.832821	2.93	.328336	9.18
23	.822348	2.98	.296363	8.90	23	.832997	2.93	.328887	9.18
24	.822527	2.98	.296897	8.90	24	.833173	2.93	.329438	9.18
25	9.822706	2.98	0.297431	8.90	25	9.833349	2.93	0.329989	9.20
26	.822885	2.98	.297965	8.92	26	.833525	2.92	.330541	9.20
27	.823064	2.98	.298500	8.90	27	.833700	2.93	.331093	9.20
28	.823243	2.97	.299034	8.93	28	.833876	2.92	.331645	9.22
29	.823421	2.98	.299570	8.92	29	.834051	2.93	.332198	9.20
30	9.823600	2.98	0.300105	8.93	30	9.834227	2.92	0.332750	9.23
31	.823779	2.98	.300641	8.92	31	.834402	2.93	.333304	9.22
32	.823958	2.97	.301176	8.95	32	.834578	2.92	.333857	9.23
33	.824136	2.98	.301713	8.93	33	.834753	2.92	.334411	9.23
34	.824315	2.97	.302249	8.95	34	.834928	2.93	.334965	9.25
35	9.824493	2.98	0.302786	8.95	35	9.835104	2.92	0.335520	9.23
36	.824672	2.97	.303323	8.95	36	.835279	2.92	.336074	9.25
37	.824850	2.97	.303860	8.97	37	.835454	2.92	.336629	9.27
38	.825028	2.98	.304398	8.97	38	.835629	2.92	.337185	9.27
39	.825207	2.97	.304936	8.97	39	.835804	2.92	.337741	9.27
40	9.825385	2.97	0.305474	8.97	40	9.835979	2.92	0.338297	9.27
41	.825563	2.97	.306012	8.98	41	.836154	2.92	.338853	9.28
42	.825741	2.97	.306551	8.98	42	.836329	2.92	.339410	9.28
43	.825919	2.97	.307090	8.98	43	.836504	2.90	.339967	9.28
44	.826097	2.97	.307629	9.00	44	.836678	2.92	.340524	9.30
45	9.826275	2.97	0.308169	8.98	45	9.836853	2.92	0.341082	9.30
46	.826453	2.97	.308708	9.02	46	.837028	2.90	.341640	9.30
47	.826631	2.97	.309249	9.00	47	.837202	2.92	.342198	9.30
48	.826809	2.97	.309789	9.02	48	.837377	2.90	.342756	9.32
49	.826987	2.95	.310330	9.02	49	.837551	2.92	.343315	9.33
50	9.827164	2.97	0.310871	9.02	50	9.837726	2.90	0.343875	9.32
51	.827342	2.95	.311412	9.02	51	.837900	2.92	.344434	9.33
52	.827519	2.97	.311953	9.03	52	.838075	2.90	.344994	9.33
53	.827697	2.95	.312495	9.03	53	.838249	2.90	.345554	9.35
54	.827874	2.97	.313037	9.05	54	.838423	2.90	.346115	9.35
55	9.828052	2.95	0.313580	9.03	55	9.838597	2.90	0.346676	9.35
56	.828229	2.95	.314122	9.05	56	.838771	2.90	.347237	9.35
57	.828406	2.97	.314665	9.07	57	.838945	2.90	.347798	9.37
58	.828584	2.95	.315209	9.05	58	.839119	2.90	.348360	9.37
59	.828761	2.95	.315752	9.07	59	.839293	2.90	.348922	9.38
60	9.828938		0.316296		60	9.839467		0.349485	

TABLE XV.—LOGARITHMIC VERSED SINES

72°					73°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	9.839467	2.90	0.349485	9.38	0	9.849805	2.85	0.383870	9.73
1	.839641	2.90	.350048	9.38	1	.849976	2.85	.384454	9.73
2	.839815	2.90	.350611	9.40	2	.850147	2.83	.385038	9.75
3	.839989	2.88	.351175	9.38	3	.850317	2.85	.385623	9.77
4	.840162	2.90	.351738	9.42	4	.850488	2.83	.386209	9.75
5	9.840336	2.90	0.352303	9.40	5	9.850658	2.85	0.386794	9.77
6	.840510	2.88	.352867	9.42	6	.850829	2.83	.387380	9.78
7	.840683	2.90	.353432	9.42	7	.850999	2.83	.387967	9.78
8	.840857	2.88	.353997	9.43	8	.851169	2.85	.388554	9.78
9	.841030	2.90	.354563	9.43	9	.851340	2.83	.389141	9.78
10	9.841204	2.88	0.355129	9.43	10	9.851510	2.83	0.389728	9.80
11	.841377	2.88	.355695	9.43	11	.851680	2.83	.390316	9.82
12	.841550	2.88	.356261	9.45	12	.851850	2.83	.390905	9.80
13	.841723	2.88	.356828	9.45	13	.852020	2.83	.391493	9.82
14	.841896	2.90	.357395	9.47	14	.852190	2.83	.392082	9.83
15	9.842070	2.88	0.357963	9.47	15	9.852360	2.83	0.392672	9.83
16	.842243	2.88	.358531	9.47	16	.852530	2.83	.393262	9.83
17	.842416	2.88	.359099	9.48	17	.852700	2.83	.393852	9.85
18	.842589	2.88	.359668	9.48	18	.852870	2.83	.394443	9.85
19	.842762	2.87	.360237	9.48	19	.853040	2.82	.395034	9.85
20	9.842934	2.88	0.360806	9.50	20	9.853209	2.83	0.395625	9.87
21	.843107	2.88	.361376	9.50	21	.853379	2.83	.396217	9.87
22	.843280	2.88	.361946	9.50	22	.853549	2.82	.396809	9.88
23	.843453	2.87	.362516	9.52	23	.853718	2.83	.397402	9.88
24	.843625	2.88	.363087	9.52	24	.853888	2.82	.397995	9.90
25	9.843798	2.87	0.363658	9.52	25	9.854057	2.83	0.398589	9.88
26	.843970	2.88	.364229	9.53	26	.854227	2.82	.399182	9.92
27	.844143	2.87	.364801	9.53	27	.854396	2.82	.399777	9.90
28	.844315	2.88	.365373	9.53	28	.854565	2.83	.400371	9.92
29	.844488	2.87	.365945	9.55	29	.854735	2.82	.400966	9.93
30	9.844660	2.87	0.366518	9.55	30	9.854904	2.82	0.401562	9.93
31	.844832	2.87	.367091	9.57	31	.855073	2.82	.402158	9.93
32	.845004	2.88	.367665	9.57	32	.855242	2.82	.402754	9.95
33	.845177	2.87	.368239	9.57	33	.855411	2.82	.403351	9.95
34	.845349	2.87	.368813	9.57	34	.855580	2.82	.403948	9.95
35	9.845521	2.87	0.369387	9.58	35	9.855749	2.82	0.404545	9.97
36	.845693	2.87	.369962	9.60	36	.855918	2.82	.405143	9.98
37	.845865	2.87	.370538	9.58	37	.856087	2.80	.405742	9.97
38	.846037	2.85	.371113	9.60	38	.856255	2.82	.406340	9.98
39	.846208	2.87	.371689	9.62	39	.856424	2.82	.406939	10.00
40	9.846380	2.87	0.372266	9.60	40	9.856593	2.82	0.407539	10.00
41	.846552	2.87	.372842	9.62	41	.856762	2.80	.408139	10.00
42	.846724	2.85	.373419	9.63	42	.856930	2.82	.408739	10.02
43	.846895	2.87	.373997	9.63	43	.857099	2.80	.409340	10.02
44	.847067	2.85	.374575	9.63	44	.857267	2.82	.409941	10.03
45	9.847238	2.87	0.375153	9.63	45	9.857436	2.80	0.410543	10.03
46	.847410	2.85	.375731	9.65	46	.857604	2.80	.411145	10.03
47	.847581	2.87	.376310	9.67	47	.857772	2.82	.411747	10.05
48	.847753	2.85	.376890	9.65	48	.857941	2.80	.412350	10.07
49	.847924	2.85	.377469	9.67	49	.858109	2.80	.412954	10.05
50	9.848095	2.87	0.378049	9.68	50	9.858277	2.80	0.413557	10.07
51	.848267	2.85	.378630	9.67	51	.858445	2.80	.414161	10.08
52	.848438	2.85	.379210	9.70	52	.858613	2.80	.414766	10.08
53	.848609	2.85	.379792	9.68	53	.858781	2.80	.415371	10.08
54	.848780	2.85	.380373	9.70	54	.858949	2.80	.415976	10.10
55	9.848951	2.85	0.380955	9.70	55	9.859117	2.80	0.416582	10.12
56	.849122	2.85	.381537	9.72	56	.859285	2.80	.417189	10.10
57	.849293	2.85	.382120	9.72	57	.859453	2.80	.417795	10.12
58	.849464	2.83	.382703	9.72	58	.859621	2.78	.418402	10.13
59	.849634	2.85	.383286	9.73	59	.859788	2.80	.419010	10.13
60	9.849805		0.383870		60	9.859956		0.419618	

74°

M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.859956	2.80	0.419618	10.13
1	.860124	2.78	.420226	10.15
2	.860291	2.80	.420835	10.17
3	.860459	2.78	.421445	10.15
4	.860626	2.80	.422054	10.17
5	9.860794	2.78	0.422664	10.18
6	.860961	2.78	.423275	10.18
7	.861128	2.80	.423886	10.20
8	.861296	2.78	.424498	10.20
9	.861463	2.78	.425110	10.20
10	9.861630	2.78	0.425722	10.22
11	.861797	2.78	.426335	10.22
12	.861964	2.78	.426948	10.23
13	.862131	2.78	.427562	10.23
14	.862298	2.78	.428176	10.23
15	9.862465	2.78	0.428790	10.27
16	.862632	2.78	.429406	10.25
17	.862799	2.77	.430021	10.27
18	.862965	2.78	.430637	10.27
19	.863132	2.78	.431253	10.28
20	9.863299	2.77	0.431870	10.30
21	.863465	2.78	.432488	10.28
22	.863632	2.78	.433105	10.32
23	.863799	2.77	.433724	10.30
24	.863965	2.77	.434342	10.32
25	9.864131	2.78	0.434961	10.33
26	.864298	2.77	.435581	10.33
27	.864464	2.77	.436201	10.33
28	.864630	2.78	.436821	10.35
29	.864797	2.77	.437442	10.37
30	9.864963	2.77	0.438064	10.37
31	.865129	2.77	.438686	10.37
32	.865295	2.77	.439308	10.38
33	.865461	2.77	.439931	10.38
34	.865627	2.77	.440554	10.40
35	9.865793	2.77	0.441178	10.40
36	.865959	2.75	.441802	10.42
37	.866124	2.77	.442427	10.42
38	.866290	2.77	.443052	10.43
39	.866456	2.77	.443678	10.43
40	9.866622	2.75	0.444304	10.45
41	.866787	2.77	.444931	10.45
42	.866953	2.75	.445558	10.45
43	.867118	2.77	.446185	10.47
44	.867284	2.75	.446813	10.48
45	9.867449	2.75	0.447442	10.48
46	.867614	2.77	.448071	10.48
47	.867780	2.75	.448700	10.50
48	.867945	2.75	.449330	10.52
49	.868110	2.75	.449961	10.52
50	9.868275	2.75	0.450592	10.52
51	.868440	2.77	.451223	10.53
52	.868606	2.75	.451855	10.53
53	.868771	2.75	.452487	10.55
54	.868936	2.73	.453120	10.57
55	9.869100	2.75	0.453754	10.57
56	.869265	2.75	.454388	10.57
57	.869430	2.75	.455022	10.58
58	.869595	2.75	.455657	10.58
59	.869760	2.73	.456292	10.60
60	9.869924		0.456928	

75°

M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.869924	2.75	0.456928	10.60
1	.870089	2.73	.457564	10.62
2	.870253	2.75	.458201	10.63
3	.870418	2.73	.458839	10.62
4	.870582	2.75	.459476	10.65
5	9.870747	2.73	0.460115	10.65
6	.870911	2.75	.460754	10.65
7	.871076	2.73	.461393	10.67
8	.871240	2.73	.462033	10.67
9	.871404	2.73	.462673	10.68
10	9.871568	2.73	0.463314	10.70
11	.871732	2.73	.463956	10.70
12	.871896	2.73	.464598	10.70
13	.872060	2.73	.465240	10.72
14	.872224	2.73	.465883	10.73
15	9.872388	2.73	0.466527	10.73
16	.872552	2.73	.467171	10.73
17	.872716	2.73	.467815	10.75
18	.872880	2.72	.468460	10.77
19	.873043	2.73	.469106	10.77
20	9.873207	2.73	0.469752	10.77
21	.873371	2.72	.470398	10.78
22	.873534	2.73	.471045	10.80
23	.873698	2.72	.471693	10.80
24	.873861	2.73	.472341	10.82
25	9.874025	2.72	0.472990	10.82
26	.874188	2.72	.473639	10.83
27	.874351	2.73	.474289	10.83
28	.874515	2.72	.474939	10.85
29	.874678	2.72	.475590	10.87
30	9.874841	2.72	0.476242	10.85
31	.875004	2.72	.476893	10.88
32	.875167	2.72	.477546	10.88
33	.875330	2.72	.478199	10.88
34	.875493	2.72	.478852	10.90
35	9.875656	2.72	0.479506	10.92
36	.875819	2.72	.480161	10.92
37	.875982	2.72	.480816	10.93
38	.876145	2.72	.481472	10.93
39	.876308	2.70	.482128	10.95
40	9.876470	2.72	0.482785	10.95
41	.876633	2.72	.483442	10.97
42	.876796	2.70	.484100	10.98
43	.876958	2.72	.484759	10.98
44	.877121	2.70	.485418	10.98
45	9.877283	2.70	0.486077	11.02
46	.877445	2.72	.486738	11.00
47	.877608	2.70	.487398	11.02
48	.877770	2.70	.488059	11.03
49	.877932	2.72	.488721	11.05
50	9.878095	2.70	0.489384	11.05
51	.878257	2.70	.490047	11.05
52	.878419	2.70	.490710	11.07
53	.878581	2.70	.491374	11.08
54	.878743	2.70	.492039	11.08
55	9.878905	2.70	0.492704	11.10
56	.879067	2.70	.493370	11.10
57	.879229	2.68	.494036	11.12
58	.879390	2.70	.494703	11.13
59	.879552	2.70	.495371	11.13
60	9.879714		0.496039	

TABLE XV.—LOGARITHMIC VERSED SINES

76°					77°					
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.879714	2.70	0.496039	11.13	0	9.889329	2.65	0.537241	11.77
1	.879876	2.68	.496707	11.17	1	.889488	2.65	.537947	11.78
2	.880037	2.70	.497377	11.17	2	.889647	2.63	.538654	11.80
3	.880199	2.68	.498047	11.17	3	.889805	2.65	.539362	11.82
4	.880360	2.70	.498717	11.18	4	.889964	2.65	.540071	11.82
5	9.880522	2.68	0.499388	11.20	5	9.890123	2.63	0.540780	11.83
6	.880683	2.70	.500060	11.20	6	.890281	2.65	.541490	11.83
7	.880845	2.68	.500732	11.22	7	.890440	2.63	.542200	11.85
8	.881006	2.68	.501405	11.22	8	.890598	2.65	.542911	11.87
9	.881167	2.68	.502078	11.23	9	.890757	2.63	.543623	11.88
10	9.881328	2.70	0.502752	11.23	10	9.890915	2.63	0.544336	11.88
11	.881490	2.68	.503426	11.27	11	.891073	2.65	.545049	11.90
12	.881651	2.68	.504102	11.25	12	.891232	2.63	.545763	11.90
13	.881812	2.68	.504777	11.28	13	.891390	2.63	.546477	11.93
14	.881973	2.68	.505454	11.28	14	.891548	2.63	.547193	11.93
15	9.882134	2.68	0.506131	11.28	15	9.891706	2.63	0.547909	11.95
16	.882295	2.68	.506808	11.30	16	.891864	2.63	.548626	11.95
17	.882456	2.68	.507486	11.32	17	.892022	2.63	.549343	11.97
18	.882617	2.67	.508165	11.32	18	.892180	2.63	.550061	11.98
19	.882777	2.68	.508844	11.33	19	.892338	2.63	.550780	12.00
20	9.882938	2.68	0.509524	11.35	20	9.892496	2.63	0.551500	12.00
21	.883099	2.68	.510205	11.35	21	.892654	2.63	.552220	12.02
22	.883260	2.67	.510886	11.37	22	.892812	2.62	.552941	12.03
23	.883420	2.68	.511568	11.37	23	.892969	2.63	.553663	12.03
24	.883581	2.67	.512250	11.38	24	.893127	2.63	.554385	12.07
25	9.883741	2.68	0.512933	11.40	25	9.893285	2.62	0.555109	12.07
26	.883902	2.67	.513617	11.40	26	.893442	2.63	.555833	12.07
27	.884062	2.68	.514301	11.42	27	.893600	2.63	.556557	12.10
28	.884223	2.67	.514986	11.43	28	.893758	2.62	.557283	12.10
29	.884383	2.67	.515672	11.43	29	.893915	2.62	.558009	12.12
30	9.884543	2.67	0.516358	11.45	30	9.894072	2.63	0.558736	12.12
31	.884703	2.68	.517045	11.45	31	.894230	2.62	.559463	12.15
32	.884864	2.67	.517732	11.47	32	.894387	2.62	.560192	12.15
33	.885024	2.67	.518420	11.48	33	.894544	2.63	.560921	12.17
34	.885184	2.67	.519109	11.48	34	.894702	2.62	.561651	12.17
35	9.885344	2.67	0.519798	11.50	35	9.894859	2.62	0.562381	12.20
36	.885504	2.67	.520488	11.52	36	.895016	2.62	.563113	12.20
37	.885664	2.67	.521179	11.52	37	.895173	2.62	.563845	12.20
38	.885824	2.65	.521870	11.53	38	.895330	2.62	.564577	12.23
39	.885983	2.67	.522562	11.53	39	.895487	2.62	.565311	12.23
40	9.886143	2.67	0.523254	11.55	40	9.895644	2.62	0.566045	12.27
41	.886303	2.67	.523947	11.57	41	.895801	2.62	.566781	12.25
42	.886463	2.65	.524641	11.57	42	.895958	2.62	.567516	12.28
43	.886622	2.67	.525335	11.58	43	.896115	2.62	.568253	12.28
44	.886782	2.65	.526030	11.60	44	.896272	2.60	.568990	12.32
45	9.886941	2.67	0.526726	11.62	45	9.896428	2.62	0.569729	12.32
46	.887101	2.65	.527423	11.62	46	.896585	2.62	.570468	12.32
47	.887260	2.67	.528120	11.62	47	.896742	2.60	.571207	12.35
48	.887420	2.65	.528817	11.65	48	.896898	2.62	.571948	12.35
49	.887579	2.67	.529516	11.65	49	.897055	2.60	.572689	12.37
50	9.887739	2.65	0.530215	11.65	50	9.897211	2.62	0.573431	12.38
51	.887898	2.65	.530914	11.67	51	.897368	2.60	.574174	12.38
52	.888057	2.65	.531614	11.68	52	.897524	2.60	.574917	12.42
53	.888216	2.65	.532315	11.70	53	.897680	2.62	.575662	12.42
54	.888375	2.65	.533017	11.70	54	.897837	2.60	.576407	12.43
55	9.888534	2.65	0.533719	11.72	55	9.897993	2.60	0.577153	12.45
56	.888693	2.65	.534422	11.73	56	.898149	2.60	.577900	12.45
57	.888852	2.65	.535126	11.73	57	.898305	2.60	.578647	12.48
58	.889011	2.65	.535830	11.75	58	.898461	2.62	.579396	12.48
59	.889170	2.65	.536535	11.77	59	.898618	2.60	.580145	12.50
60	9.889329		0.537241		60	9.898774		0.580895	

78°					79°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.898774	2.60	0.580895	12.50	0	9.908051	2.55	0.627452	13.40
1	.898930	2.60	.581645	12.53	1	.908204	2.55	.628256	13.40
2	.899086	2.58	.582397	12.53	2	.908357	2.57	.629060	13.43
3	.899241	2.60	.583149	12.57	3	.908511	2.55	.629866	13.45
4	.899397	2.60	.583903	12.57	4	.908664	2.55	.630673	13.45
5	9.899553	2.60	0.584657	12.57	5	9.908817	2.55	0.631480	13.48
6	.899709	2.60	.585411	12.60	6	.908970	2.55	.632289	13.48
7	.899865	2.58	.586167	12.60	7	.909123	2.55	.633098	13.52
8	.900020	2.60	.586923	12.63	8	.909276	2.53	.633909	13.52
9	.900176	2.58	.587681	12.63	9	.909428	2.55	.634720	13.55
10	9.900331	2.60	0.588439	12.65	10	9.909581	2.55	0.635533	13.55
11	.900487	2.58	.589198	12.65	11	.909734	2.55	.636346	13.58
12	.900642	2.60	.589957	12.68	12	.909887	2.53	.637161	13.58
13	.900798	2.58	.590718	12.68	13	.910039	2.55	.637976	13.60
14	.900953	2.58	.591479	12.72	14	.910192	2.55	.638792	13.63
15	9.901108	2.60	0.592242	12.72	15	9.910345	2.53	0.639610	13.63
16	.901264	2.58	.593005	12.73	16	.910497	2.55	.640428	13.67
17	.901419	2.58	.593769	12.73	17	.910650	2.53	.641248	13.67
18	.901574	2.58	.594533	12.77	18	.910802	2.55	.642068	13.70
19	.901729	2.58	.595299	12.78	19	.910955	2.53	.642890	13.72
20	9.901884	2.60	0.596066	12.78	20	9.911107	2.53	0.643713	13.72
21	.902040	2.58	.596833	12.80	21	.911259	2.55	.644536	13.75
22	.902195	2.58	.597601	12.82	22	.911412	2.53	.645361	13.75
23	.902350	2.57	.598370	12.83	23	.911564	2.53	.646186	13.78
24	.902504	2.58	.599140	12.85	24	.911716	2.53	.647013	13.80
25	9.902659	2.58	0.599911	12.85	25	9.911868	2.53	0.647841	13.82
26	.902814	2.58	.600682	12.88	26	.912020	2.53	.648670	13.82
27	.902969	2.58	.601455	12.88	27	.912172	2.53	.649499	13.85
28	.903124	2.57	.602228	12.92	28	.912324	2.53	.650330	13.87
29	.903278	2.58	.603003	12.92	29	.912476	2.53	.651162	13.88
30	9.903433	2.58	0.603778	12.93	30	9.912628	2.53	0.651995	13.90
31	.903588	2.57	.604554	12.95	31	.912780	2.53	.652829	13.92
32	.903742	2.58	.605331	12.95	32	.912932	2.53	.653664	13.95
33	.903897	2.57	.606108	12.98	33	.913084	2.52	.654501	13.95
34	.904051	2.58	.606887	13.00	34	.913235	2.53	.655338	13.97
35	9.904206	2.57	0.607667	13.00	35	9.913387	2.53	0.656176	14.00
36	.904360	2.57	.608447	13.02	36	.913539	2.52	.657016	14.00
37	.904514	2.57	.609228	13.03	37	.913690	2.53	.657856	14.03
38	.904668	2.58	.610010	13.07	38	.913842	2.52	.658698	14.03
39	.904823	2.57	.610794	13.07	39	.913993	2.53	.659540	14.07
40	9.904977	2.57	0.611578	13.08	40	9.914145	2.52	0.660384	14.08
41	.905131	2.57	.612363	13.08	41	.914296	2.53	.661229	14.10
42	.905285	2.57	.613148	13.12	42	.914448	2.52	.662075	14.12
43	.905439	2.57	.613935	13.13	43	.914599	2.52	.662922	14.13
44	.905593	2.57	.614723	13.13	44	.914750	2.53	.663770	14.15
45	9.905747	2.57	0.615511	13.17	45	9.914902	2.52	0.664619	14.18
46	.905901	2.57	.616301	13.17	46	.915053	2.52	.665470	14.18
47	.906055	2.57	.617091	13.20	47	.915204	2.52	.666321	14.22
48	.906209	2.57	.617883	13.20	48	.915355	2.52	.667174	14.23
49	.906363	2.55	.618675	13.22	49	.915506	2.52	.668028	14.25
50	9.906516	2.57	0.619468	13.23	50	9.915657	2.52	0.668883	14.27
51	.906670	2.57	.620262	13.25	51	.915808	2.52	.669739	14.28
52	.906824	2.55	.621057	13.27	52	.915959	2.52	.670596	14.30
53	.906977	2.57	.621853	13.28	53	.916110	2.52	.671454	14.33
54	.907131	2.55	.622650	13.30	54	.916261	2.52	.672314	14.33
55	9.907284	2.57	0.623448	13.32	55	9.916412	2.50	0.673174	14.37
56	.907438	2.55	.624247	13.33	56	.916562	2.52	.674036	14.38
57	.907591	2.55	.625047	13.35	57	.916713	2.52	.674899	14.40
58	.907744	2.57	.625848	13.37	58	.916864	2.50	.675763	14.42
59	.907898	2.55	.626650	13.37	59	.917014	2.52	.676628	14.45
60	9.908051		0.627452		60	9.917165		0.677495	

TABLE XV.—LOGARITHMIC VERSED SINES

80°					81°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.917165	2.52	0.677495	14.45	0	9.926119	2.47	0.731786	15.78
1	.917316	2.50	.678362	14.48	1	.926267	2.47	.732733	15.78
2	.917466	2.50	.679231	14.50	2	.926415	2.45	.733680	15.83
3	.917616	2.52	.680101	14.52	3	.926562	2.47	.734630	15.83
4	.917767	2.50	.680972	14.55	4	.926710	2.47	.735580	15.87
5	9.917917	2.52	0.681845	14.55	5	9.926858	2.47	0.736532	15.90
6	.918068	2.50	.682718	14.58	6	.927006	2.45	.737486	15.92
7	.918218	2.50	.683593	14.60	7	.927153	2.47	.738441	15.95
8	.918368	2.50	.684469	14.62	8	.927301	2.45	.739398	15.97
9	.918518	2.50	.685346	14.63	9	.927448	2.47	.740356	16.00
10	9.918668	2.50	0.686224	14.67	10	9.927596	2.45	0.741316	16.02
11	.918818	2.50	.687104	14.68	11	.927743	2.47	.742277	16.03
12	.918968	2.50	.687985	14.70	12	.927891	2.45	.743239	16.08
13	.919118	2.50	.688867	14.72	13	.928038	2.45	.744204	16.08
14	.919268	2.50	.689750	14.73	14	.928185	2.47	.745169	16.13
15	9.919418	2.50	0.690634	14.77	15	9.928333	2.45	0.746137	16.13
16	.919568	2.50	.691520	14.78	16	.928480	2.45	.747105	16.18
17	.919718	2.50	.692407	14.80	17	.928627	2.45	.748076	16.20
18	.919868	2.50	.693295	14.83	18	.928774	2.45	.749048	16.22
19	.920018	2.48	.694185	14.83	19	.928921	2.45	.750021	16.25
20	9.920167	2.50	0.695075	14.87	20	9.929068	2.45	0.750996	16.28
21	.920317	2.48	.695967	14.90	21	.929215	2.45	.751973	16.30
22	.920466	2.50	.696861	14.90	22	.929362	2.45	.752951	16.33
23	.920616	2.50	.697755	14.93	23	.929509	2.45	.753931	16.35
24	.920766	2.48	.698651	14.95	24	.929656	2.45	.754912	16.38
25	9.920915	2.48	0.699548	14.97	25	9.929803	2.45	0.755895	16.42
26	.921064	2.50	.700446	15.00	26	.929950	2.45	.756880	16.43
27	.921214	2.48	.701346	15.02	27	.930097	2.43	.757866	16.47
28	.921363	2.48	.702247	15.03	28	.930243	2.45	.758854	16.50
29	.921512	2.50	.703149	15.05	29	.930390	2.45	.759844	16.52
30	9.921662	2.48	0.704052	15.08	30	9.930537	2.43	0.760835	16.53
31	.921811	2.48	.704957	15.10	31	.930683	2.45	.761827	16.58
32	.921960	2.48	.705863	15.13	32	.930830	2.43	.762822	16.60
33	.922109	2.48	.706771	15.15	33	.930976	2.45	.763818	16.62
34	.922258	2.48	.707680	15.17	34	.931123	2.43	.764815	16.67
35	9.922407	2.48	0.708590	15.18	35	9.931269	2.45	0.765815	16.68
36	.922556	2.48	.709501	15.22	36	.931416	2.43	.766816	16.72
37	.922705	2.48	.710414	15.23	37	.931562	2.43	.767819	16.73
38	.922854	2.48	.711328	15.25	38	.931708	2.45	.768823	16.77
39	.923003	2.48	.712243	15.28	39	.931855	2.43	.769829	16.80
40	9.923152	2.48	0.713160	15.30	40	9.932001	2.43	0.770837	16.82
41	.923301	2.47	.714078	15.33	41	.932147	2.43	.771846	16.87
42	.923449	2.48	.714998	15.35	42	.932293	2.43	.772858	16.87
43	.923598	2.48	.715919	15.37	43	.932439	2.43	.773870	16.92
44	.923747	2.47	.716841	15.38	44	.932585	2.43	.774885	16.95
45	9.923895	2.48	0.717764	15.42	45	9.932731	2.43	0.775902	16.97
46	.924044	2.47	.718689	15.45	46	.932877	2.43	.776920	17.00
47	.924192	2.48	.719616	15.45	47	.933023	2.43	.777940	17.02
48	.924341	2.47	.720543	15.48	48	.933169	2.43	.778961	17.07
49	.924489	2.47	.721472	15.52	49	.933315	2.42	.779985	17.08
50	9.924637	2.48	0.722403	15.53	50	9.933460	2.43	0.781010	17.12
51	.924786	2.47	.723335	15.55	51	.933606	2.43	.782037	17.13
52	.924934	2.47	.724268	15.58	52	.933752	2.42	.783065	17.18
53	.925082	2.48	.725203	15.60	53	.933897	2.43	.784096	17.20
54	.925231	2.47	.726139	15.63	54	.934043	2.43	.785128	17.23
55	9.925379	2.47	0.727077	15.65	55	9.934189	2.42	0.786162	17.27
56	.925527	2.47	.728016	15.67	56	.934334	2.43	.787198	17.30
57	.925675	2.47	.728956	15.70	57	.934480	2.42	.788236	17.33
58	.925823	2.47	.729898	15.73	58	.934625	2.42	.789276	17.35
59	.925971	2.47	.730842	15.73	59	.934770	2.43	.790317	17.40
60	9.926119		0.731786		60	9.934916		0.791361	

82°					83°				
M.	Vers.	D. 1".	Exsec.	D. 1".	M.	Vers.	D. 1".	Exsec.	D. 1".
0	9.934916	2.42	0.791361	17.42	0	9.943559	2.38	0.857665	19.55
1	.935061	2.42	.792406	17.45	1	.943702	2.38	.858838	19.58
2	.935206	2.43	.793453	17.48	2	.943845	2.37	.860013	19.63
3	.935352	2.42	.794502	17.50	3	.943987	2.38	.861191	19.67
4	.935497	2.42	.795552	17.55	4	.944130	2.38	.862371	19.72
5	9.935642	2.42	0.796605	17.58	5	9.944273	2.37	0.863554	19.75
6	.935787	2.42	.797660	17.60	6	.944415	2.38	.864739	19.80
7	.935932	2.42	.798716	17.63	7	.944558	2.37	.865927	19.83
8	.936077	2.42	.799774	17.68	8	.944700	2.38	.867117	19.88
9	.936222	2.42	.800835	17.70	9	.944843	2.37	.868310	19.92
10	9.936367	2.42	0.801897	17.73	10	9.944985	2.37	0.869505	19.97
11	.936512	2.42	.802961	17.77	11	.945127	2.38	.870703	20.00
12	.936657	2.40	.804027	17.80	12	.945270	2.37	.871903	20.05
13	.936801	2.42	.805095	17.83	13	.945412	2.37	.873106	20.10
14	.936946	2.42	.806165	17.87	14	.945554	2.37	.874312	20.13
15	9.937091	2.42	0.807237	17.90	15	9.945696	2.37	0.875520	20.18
16	.937236	2.40	.808311	17.93	16	.945838	2.38	.876731	20.23
17	.937380	2.42	.809387	17.97	17	.945981	2.37	.877945	20.27
18	.937525	2.40	.810465	18.00	18	.946123	2.37	.879161	20.30
19	.937669	2.42	.811545	18.03	19	.946265	2.37	.880379	20.37
20	9.937814	2.40	0.812627	18.07	20	9.946407	2.37	0.881601	20.40
21	.937958	2.42	.813711	18.10	21	.946549	2.35	.882825	20.45
22	.938103	2.40	.814797	18.13	22	.946690	2.37	.884052	20.48
23	.938247	2.40	.815885	18.17	23	.946832	2.37	.885281	20.55
24	.938391	2.42	.816975	18.20	24	.946974	2.37	.886514	20.58
25	9.938536	2.40	0.818067	18.23	25	9.947116	2.37	0.887749	20.62
26	.938680	2.40	.819161	18.27	26	.947258	2.35	.888986	20.68
27	.938824	2.40	.820257	18.32	27	.947399	2.37	.890227	20.72
28	.938968	2.40	.821356	18.33	28	.947541	2.37	.891470	20.77
29	.939112	2.42	.822456	18.38	29	.947683	2.35	.892716	20.82
30	9.939257	2.40	0.823559	18.42	30	9.947824	2.37	0.893965	20.87
31	.939401	2.40	.824664	18.43	31	.947966	2.35	.895217	20.92
32	.939545	2.38	.825770	18.48	32	.948107	2.37	.896472	20.95
33	.939688	2.40	.826879	18.52	33	.948249	2.35	.897729	21.00
34	.939832	2.40	.827990	18.57	34	.948390	2.35	.898989	21.07
35	9.939976	2.40	0.829104	18.58	35	9.948531	2.37	0.900253	21.10
36	.940120	2.40	.830219	18.63	36	.948673	2.35	.901519	21.15
37	.940264	2.40	.831337	18.65	37	.948814	2.35	.902788	21.20
38	.940408	2.38	.832456	18.70	38	.948955	2.35	.904060	21.25
39	.940551	2.40	.833578	18.75	39	.949096	2.35	.905335	21.30
40	9.940695	2.40	0.834703	18.77	40	9.949237	2.37	0.906613	21.33
41	.940839	2.38	.835829	18.80	41	.949379	2.35	.907893	21.40
42	.940982	2.40	.836957	18.85	42	.949520	2.35	.909177	21.45
43	.941126	2.38	.838088	18.88	43	.949661	2.35	.910464	21.50
44	.941269	2.40	.839221	18.93	44	.949802	2.35	.911754	21.55
45	9.941413	2.38	0.840357	18.95	45	9.949943	2.33	0.913047	21.60
46	.941556	2.38	.841494	19.00	46	.950083	2.35	.914343	21.65
47	.941699	2.40	.842634	19.03	47	.950224	2.35	.915642	21.70
48	.941843	2.38	.843776	19.08	48	.950365	2.35	.916944	21.75
49	.941986	2.38	.844921	19.12	49	.950506	2.35	.918249	21.82
50	9.942129	2.38	0.846068	19.15	50	9.950647	2.33	0.919558	21.85
51	.942272	2.38	.847217	19.18	51	.950787	2.35	.920869	21.92
52	.942415	2.40	.848368	19.23	52	.950928	2.35	.922184	21.97
53	.942559	2.38	.849522	19.27	53	.951069	2.33	.923502	22.02
54	.942702	2.38	.850678	19.30	54	.951209	2.35	.924823	22.07
55	9.942845	2.38	0.851836	19.35	55	9.951350	2.33	0.926147	22.13
56	.942988	2.38	.852997	19.40	56	.951490	2.35	.927475	22.17
57	.943131	2.37	.854161	19.42	57	.951631	2.33	.928805	22.23
58	.943273	2.38	.855326	19.47	58	.951771	2.33	.930139	22.30
59	.943416	2.38	.856494	19.52	59	.951911	2.35	.931477	22.33
60	9.943559		0.857665		60	9.952052		0.932817	

TABLE XV.—LOGARITHMIC VERSED SINES

80°					81°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.917165	2.52	0.677495	14.45	0	9.926119	2.47	0.731786	15.78
1	.917316	2.50	.678362	14.48	1	.926267	2.47	.732733	15.78
2	.917466	2.50	.679231	14.50	2	.926415	2.45	.733680	15.83
3	.917616	2.52	.680101	14.52	3	.926562	2.47	.734630	15.83
4	.917767	2.50	.680972	14.55	4	.926710	2.47	.735580	15.87
5	9.917917	2.52	0.681845	14.55	5	9.926858	2.47	0.736532	15.90
6	.918068	2.50	.682718	14.58	6	.927006	2.45	.737486	15.92
7	.918218	2.50	.683593	14.60	7	.927153	2.47	.738441	15.95
8	.918368	2.50	.684469	14.62	8	.927301	2.45	.739398	15.97
9	.918518	2.50	.685346	14.63	9	.927448	2.47	.740356	16.00
10	9.918668	2.50	0.686224	14.67	10	9.927596	2.45	0.741316	16.02
11	.918818	2.50	.687104	14.68	11	.927743	2.47	.742277	16.03
12	.918968	2.50	.687985	14.70	12	.927891	2.45	.743239	16.08
13	.919118	2.50	.688867	14.72	13	.928038	2.45	.744204	16.08
14	.919268	2.50	.689750	14.73	14	.928185	2.47	.745169	16.13
15	9.919418	2.50	0.690634	14.77	15	9.928333	2.45	0.746137	16.13
16	.919568	2.50	.691520	14.78	16	.928480	2.45	.747105	16.18
17	.919718	2.50	.692407	14.80	17	.928627	2.45	.748076	16.20
18	.919868	2.50	.693295	14.83	18	.928774	2.45	.749048	16.22
19	.920018	2.48	.694185	14.83	19	.928921	2.45	.750021	16.25
20	9.920167	2.50	0.695075	14.87	20	9.929068	2.45	0.750996	16.28
21	.920317	2.48	.695967	14.90	21	.929215	2.45	.751973	16.30
22	.920466	2.50	.696861	14.90	22	.929362	2.45	.752951	16.33
23	.920616	2.50	.697755	14.93	23	.929509	2.45	.753931	16.35
24	.920766	2.48	.698651	14.95	24	.929656	2.45	.754912	16.38
25	9.920915	2.48	0.699548	14.97	25	9.929803	2.45	0.755895	16.42
26	.921064	2.50	.700446	15.00	26	.929950	2.45	.756880	16.43
27	.921214	2.48	.701346	15.02	27	.930097	2.43	.757866	16.47
28	.921363	2.48	.702247	15.03	28	.930243	2.45	.758854	16.50
29	.921512	2.50	.703149	15.05	29	.930390	2.45	.759844	16.52
30	9.921662	2.48	0.704052	15.08	30	9.930537	2.43	0.760835	16.53
31	.921811	2.48	.704957	15.10	31	.930683	2.45	.761827	16.58
32	.921960	2.48	.705863	15.13	32	.930830	2.43	.762822	16.60
33	.922109	2.48	.706771	15.15	33	.930976	2.45	.763818	16.62
34	.922258	2.48	.707680	15.17	34	.931123	2.43	.764815	16.67
35	9.922407	2.48	0.708590	15.18	35	9.931269	2.45	0.765815	16.68
36	.922556	2.48	.709501	15.22	36	.931416	2.43	.766816	16.72
37	.922705	2.48	.710414	15.23	37	.931562	2.43	.767819	16.73
38	.922854	2.48	.711328	15.25	38	.931708	2.45	.768823	16.77
39	.923003	2.48	.712243	15.28	39	.931855	2.43	.769829	16.80
40	9.923152	2.48	0.713160	15.30	40	9.932001	2.43	0.770837	16.82
41	.923301	2.47	.714078	15.33	41	.932147	2.43	.771846	16.87
42	.923449	2.48	.714998	15.35	42	.932293	2.43	.772858	16.87
43	.923598	2.48	.715919	15.37	43	.932439	2.43	.773870	16.92
44	.923747	2.47	.716841	15.38	44	.932585	2.43	.774885	16.95
45	9.923895	2.48	0.717764	15.42	45	9.932731	2.43	0.775902	16.97
46	.924044	2.47	.718689	15.45	46	.932877	2.43	.776920	17.00
47	.924192	2.48	.719616	15.45	47	.933023	2.43	.777940	17.02
48	.924341	2.47	.720543	15.48	48	.933169	2.43	.778961	17.07
49	.924489	2.47	.721472	15.52	49	.933315	2.42	.779985	17.08
50	9.924637	2.48	0.722403	15.53	50	9.933460	2.43	0.781010	17.12
51	.924786	2.47	.723335	15.55	51	.933606	2.43	.782037	17.13
52	.924934	2.47	.724268	15.58	52	.933752	2.42	.783065	17.18
53	.925082	2.48	.725203	15.60	53	.933897	2.43	.784096	17.20
54	.925231	2.47	.726139	15.63	54	.934043	2.43	.785128	17.23
55	9.925379	2.47	0.727077	15.65	55	9.934189	2.42	0.786162	17.27
56	.925527	2.47	.728016	15.67	56	.934334	2.43	.787198	17.30
57	.925675	2.47	.728956	15.70	57	.934480	2.42	.788236	17.33
58	.925823	2.47	.729898	15.73	58	.934625	2.42	.789276	17.35
59	.925971	2.47	.730842	15.73	59	.934770	2.43	.790317	17.40
60	9.926119		0.731786		60	9.934916		0.791361	

82°					83°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.934916	2.42	0.791361	17.42	0	9.943559	2.38	0.857665	19.55
1	.935061	2.42	.792406	17.45	1	.943702	2.38	.858838	19.58
2	.935206	2.43	.793453	17.48	2	.943845	2.37	.860013	19.63
3	.935352	2.42	.794502	17.50	3	.943987	2.38	.861191	19.67
4	.935497	2.42	.795552	17.55	4	.944130	2.38	.862371	19.72
5	9.935642	2.42	0.796605	17.58	5	9.944273	2.37	0.863554	19.75
6	.935787	2.42	.797660	17.60	6	.944415	2.38	.864739	19.80
7	.935932	2.42	.798716	17.63	7	.944558	2.37	.865927	19.83
8	.936077	2.42	.799774	17.68	8	.944700	2.38	.867117	19.88
9	.936222	2.42	.800835	17.70	9	.944843	2.37	.868310	19.92
10	9.936367	2.42	0.801897	17.73	10	9.944985	2.37	0.869505	19.97
11	.936512	2.42	.802961	17.77	11	.945127	2.38	.870703	20.00
12	.936657	2.40	.804027	17.80	12	.945270	2.37	.871903	20.05
13	.936801	2.42	.805095	17.83	13	.945412	2.37	.873106	20.10
14	.936946	2.42	.806165	17.87	14	.945554	2.37	.874312	20.13
15	9.937091	2.42	0.807237	17.90	15	9.945696	2.37	0.875520	20.18
16	.937236	2.40	.808311	17.93	16	.945838	2.38	.876731	20.23
17	.937380	2.42	.809387	17.97	17	.945981	2.37	.877945	20.27
18	.937525	2.40	.810465	18.00	18	.946123	2.37	.879161	20.30
19	.937669	2.42	.811545	18.03	19	.946265	2.37	.880379	20.37
20	9.937814	2.40	0.812627	18.07	20	9.946407	2.37	0.881601	20.40
21	.937958	2.42	.813711	18.10	21	.946549	2.35	.882825	20.45
22	.938103	2.40	.814797	18.13	22	.946690	2.37	.884052	20.48
23	.938247	2.40	.815885	18.17	23	.946832	2.37	.885281	20.55
24	.938391	2.42	.816975	18.20	24	.946974	2.37	.886514	20.58
25	9.938536	2.40	0.818067	18.23	25	9.947116	2.37	0.887749	20.62
26	.938680	2.40	.819161	18.27	26	.947258	2.35	.888986	20.68
27	.938824	2.40	.820257	18.32	27	.947399	2.37	.890227	20.72
28	.938968	2.40	.821356	18.33	28	.947541	2.37	.891470	20.77
29	.939112	2.42	.822456	18.38	29	.947683	2.35	.892716	20.82
30	9.939257	2.40	0.823559	18.42	30	9.947824	2.37	0.893965	20.87
31	.939401	2.40	.824664	18.43	31	.947966	2.35	.895217	20.92
32	.939545	2.38	.825770	18.48	32	.948107	2.37	.896472	20.95
33	.939688	2.40	.826879	18.52	33	.948249	2.35	.897729	21.00
34	.939832	2.40	.827990	18.57	34	.948390	2.35	.898989	21.07
35	9.939976	2.40	0.829104	18.58	35	9.948531	2.37	0.900253	21.10
36	.940120	2.40	.830219	18.63	36	.948673	2.35	.901519	21.15
37	.940264	2.40	.831337	18.65	37	.948814	2.35	.902788	21.20
38	.940408	2.38	.832456	18.70	38	.948955	2.35	.904060	21.25
39	.940551	2.40	.833578	18.75	39	.949096	2.35	.905335	21.30
40	9.940695	2.40	0.834703	18.77	40	9.949237	2.37	0.906613	21.33
41	.940839	2.38	.835829	18.80	41	.949379	2.35	.907893	21.40
42	.940982	2.40	.836957	18.85	42	.949520	2.35	.909177	21.45
43	.941126	2.38	.838088	18.88	43	.949661	2.35	.910464	21.50
44	.941269	2.40	.839221	18.93	44	.949802	2.35	.911754	21.55
45	9.941413	2.38	0.840357	18.95	45	9.949943	2.33	0.913047	21.60
46	.941556	2.38	.841494	19.00	46	.950083	2.35	.914343	21.65
47	.941699	2.40	.842634	19.03	47	.950224	2.35	.915642	21.70
48	.941843	2.38	.843776	19.08	48	.950365	2.35	.916944	21.75
49	.941986	2.38	.844921	19.12	49	.950506	2.35	.918249	21.82
50	9.942129	2.38	0.846068	19.15	50	9.950647	2.33	0.919558	21.85
51	.942272	2.38	.847217	19.18	51	.950787	2.35	.920869	21.92
52	.942415	2.40	.848368	19.23	52	.950928	2.35	.922184	21.97
53	.942559	2.38	.849522	19.27	53	.951069	2.33	.923502	22.02
54	.942702	2.38	.850678	19.30	54	.951209	2.35	.924823	22.07
55	9.942845	2.38	0.851836	19.35	55	9.951350	2.33	0.926147	22.13
56	.942988	2.38	.852997	19.40	56	.951490	2.35	.927475	22.17
57	.943131	2.37	.854161	19.42	57	.951631	2.33	.928805	22.23
58	.943273	2.38	.855326	19.47	58	.951771	2.33	.930139	22.30
59	.943416	2.38	.856494	19.52	59	.951911	2.35	.931477	22.33
60	9.943559		0.857665		60	9.952052		0.932817	

TABLE XV.—LOGARITHMIC VERSED SINES

84°					85°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.952052	2.33	0.932817	22.40	0	9.960397	2.30	1.020101	26.40
1	.952192	2.33	.934161	22.45	1	.960535	2.28	.021685	26.48
2	.952332	2.35	.935508	22.52	2	.960672	2.30	.023274	26.57
3	.952473	2.33	.936859	22.57	3	.960810	2.30	.024868	26.65
4	.952613	2.33	.938213	22.62	4	.960948	2.30	.026467	26.73
5	9.952753	2.33	0.939570	22.68	5	9.961086	2.28	1.028071	26.80
6	.952893	2.33	.940931	22.75	6	.961223	2.30	.029679	26.90
7	.953033	2.33	.942296	22.78	7	.961361	2.28	.031293	26.98
8	.953173	2.33	.943663	22.85	8	.961498	2.30	.032912	27.07
9	.953313	2.33	.945034	22.92	9	.961636	2.28	.034536	27.13
10	9.953453	2.33	0.946409	22.97	10	9.961773	2.30	1.036164	27.23
11	.953593	2.32	.947787	23.03	11	.961911	2.28	.037798	27.33
12	.953732	2.33	.949169	23.08	12	.962048	2.30	.039438	27.40
13	.953872	2.33	.950554	23.15	13	.962186	2.28	.041082	27.50
14	.954012	2.33	.951943	23.22	14	.962323	2.28	.042732	27.58
15	9.954152	2.32	0.953336	23.27	15	9.962460	2.28	1.044387	27.67
16	.954291	2.33	.954732	23.33	16	.962597	2.30	.046047	27.77
17	.954431	2.33	.956132	23.38	17	.962735	2.28	.047713	27.85
18	.954571	2.32	.957535	23.45	18	.962872	2.28	.049384	27.93
19	.954710	2.33	.958942	23.52	19	.963009	2.28	.051060	28.03
20	9.954850	2.32	0.960353	23.57	20	9.963146	2.28	1.052742	28.13
21	.954989	2.33	.961767	23.65	21	.963283	2.28	.054430	28.22
22	.955129	2.32	.963186	23.70	22	.963420	2.28	.056123	28.30
23	.955268	2.32	.964608	23.77	23	.963557	2.28	.057821	28.40
24	.955407	2.33	.966034	23.82	24	.963694	2.28	.059525	28.50
25	9.955547	2.32	0.967463	23.90	25	9.963831	2.28	1.061235	28.60
26	.955686	2.32	.968897	23.95	26	.963968	2.27	.062951	28.68
27	.955825	2.32	.970334	24.02	27	.964104	2.28	.064672	28.78
28	.955964	2.32	.971775	24.10	28	.964241	2.28	.066399	28.88
29	.956103	2.33	.973221	24.15	29	.964378	2.28	.068132	28.98
30	9.956243	2.32	0.974670	24.22	30	9.964515	2.27	1.069871	29.08
31	.956382	2.32	.976123	24.28	31	.964651	2.28	.071616	29.18
32	.956521	2.32	.977580	24.35	32	.964788	2.27	.073367	29.28
33	.956660	2.32	.979041	24.42	33	.964924	2.28	.075124	29.38
34	.956799	2.30	.980506	24.48	34	.965061	2.27	.076887	29.48
35	9.956937	2.32	0.981975	24.55	35	9.965197	2.28	1.078656	29.58
36	.957076	2.32	.983448	24.63	36	.965334	2.27	.080431	29.68
37	.957215	2.32	.984926	24.68	37	.965470	2.28	.082212	29.80
38	.957354	2.32	.986407	24.77	38	.965607	2.27	.084000	29.90
39	.957493	2.30	.987893	24.83	39	.965743	2.27	.085794	30.00
40	9.957631	2.32	0.989383	24.90	40	9.965879	2.28	1.087594	30.12
41	.957770	2.32	.990877	24.97	41	.966016	2.27	.089401	30.22
42	.957909	2.30	.992375	25.03	42	.966152	2.27	.091214	30.32
43	.958047	2.32	.993877	25.12	43	.966288	2.27	.093033	30.43
44	.958186	2.30	.995384	25.18	44	.966424	2.27	.094859	30.55
45	9.958324	2.32	0.996895	25.27	45	9.966560	2.27	1.096692	30.67
46	.958463	2.30	.998411	25.33	46	.966696	2.27	.098532	30.77
47	.958601	2.30	.999931	25.40	47	.966832	2.27	.100378	30.87
48	.958739	2.32	1.001455	25.48	48	.966968	2.27	.102230	31.00
49	.958878	2.30	.002984	25.55	49	.967104	2.27	.104090	31.12
50	9.959016	2.30	1.004517	25.63	50	9.967240	2.27	1.105957	31.22
51	.959154	2.30	.006055	25.70	51	.967376	2.27	.107830	31.35
52	.959292	2.32	.007597	25.78	52	.967512	2.25	.109711	31.45
53	.959431	2.30	.009144	25.85	53	.967647	2.27	.111598	31.58
54	.959569	2.30	.010695	25.93	54	.967783	2.27	.113493	31.68
55	9.959707	2.30	1.012251	26.00	55	9.967919	2.25	1.115394	31.82
56	.959845	2.30	.013811	26.10	56	.968054	2.27	.117303	31.93
57	.959983	2.30	.015377	26.17	57	.968190	2.27	.119219	32.07
58	.960121	2.30	.016947	26.23	58	.968326	2.25	.121143	32.18
59	.960259	2.30	.018521	26.33	59	.968461	2.27	.123074	32.30
60	9.960397		1.020101		60	9.968597		1.125012	

86°					87°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.968597	2.25	1.125012	32.43	0	9.976654	2.23	1.257854	42.52
1	.968732	2.27	.126958	32.55	1	.976788	2.22	.260405	42.73
2	.968868	2.25	.128911	32.70	2	.976921	2.22	.262969	42.95
3	.969003	2.25	.130873	32.80	3	.977054	2.22	.265546	43.20
4	.969138	2.27	.132841	32.95	4	.977187	2.22	.268138	43.42
5	9.969274	2.25	1.134818	33.07	5	9.977320	2.20	1.270743	43.67
6	.969409	2.25	.136802	33.22	6	.977452	2.22	.273363	43.88
7	.969544	2.25	.138795	33.33	7	.977585	2.22	.275996	44.15
8	.969679	2.25	.140795	33.47	8	.977718	2.22	.278645	44.38
9	.969814	2.25	.142803	33.62	9	.977851	2.22	.281308	44.63
10	9.969949	2.25	1.144820	33.73	10	9.977984	2.20	1.283986	44.88
11	.970084	2.25	.146844	33.88	11	.978116	2.22	.286679	45.13
12	.970219	2.25	.148877	34.02	12	.978249	2.22	.289387	45.38
13	.970354	2.25	.150918	34.17	13	.978382	2.20	.292110	45.65
14	.970489	2.25	.152968	34.30	14	.978514	2.22	.294849	45.92
15	9.970624	2.25	1.155026	34.43	15	9.978647	2.20	1.297604	46.17
16	.970759	2.25	.157092	34.60	16	.978779	2.22	.300374	46.45
17	.970894	2.25	.159168	34.73	17	.978912	2.20	.303161	46.72
18	.971029	2.25	.161252	34.87	18	.979044	2.22	.305964	47.00
19	.971164	2.23	.163344	35.03	19	.979177	2.20	.308784	47.27
20	9.971298	2.25	1.165446	35.17	20	9.979309	2.22	1.311620	47.55
21	.971433	2.25	.167556	35.33	21	.979442	2.20	.314473	47.83
22	.971568	2.23	.169676	35.48	22	.979574	2.20	.317343	48.13
23	.971702	2.25	.171805	35.63	23	.979706	2.20	.320231	48.43
24	.971837	2.23	.173943	35.78	24	.979838	2.20	.323137	48.72
25	9.971971	2.25	1.176090	35.93	25	9.979970	2.22	1.326060	49.02
26	.972106	2.23	.178246	36.10	26	.980103	2.20	.329001	49.33
27	.972240	2.23	.180412	36.27	27	.980235	2.20	.331961	49.63
28	.972374	2.25	.182588	36.42	28	.980367	2.20	.334939	49.93
29	.972509	2.23	.184773	36.58	29	.980499	2.20	.337935	50.27
30	9.972643	2.23	1.186968	36.75	30	9.980631	2.20	1.340951	50.58
31	.972777	2.25	.189173	36.90	31	.980763	2.20	.343986	50.92
32	.972912	2.23	.191387	37.08	32	.980895	2.18	.347041	51.23
33	.973046	2.23	.193612	37.25	33	.981026	2.20	.350115	51.58
34	.973180	2.23	.195847	37.42	34	.981158	2.20	.353210	51.92
35	9.973314	2.23	1.198092	37.58	35	9.981290	2.20	1.356325	52.25
36	.973448	2.23	.200347	37.77	36	.981422	2.20	.359460	52.62
37	.973582	2.23	.202613	37.93	37	.981554	2.18	.362617	52.95
38	.973716	2.23	.204889	38.12	38	.981685	2.20	.365794	53.32
39	.973850	2.23	.207176	38.28	39	.981817	2.20	.368993	53.68
40	9.973984	2.23	1.209473	38.47	40	9.981949	2.18	1.372214	54.07
41	.974118	2.23	.211781	38.67	41	.982080	2.20	.375458	54.42
42	.974252	2.23	.214101	38.83	42	.982212	2.18	.378723	54.80
43	.974386	2.22	.216431	39.03	43	.982343	2.20	.382011	55.20
44	.974519	2.23	.218773	39.20	44	.982475	2.18	.385323	55.58
45	9.974653	2.23	1.221125	39.42	45	9.982606	2.18	1.388658	55.97
46	.974787	2.22	.223490	39.58	46	.982737	2.20	.392016	56.38
47	.974920	2.23	.225865	39.80	47	.982869	2.18	.395399	56.80
48	.975054	2.23	.228253	39.98	48	.983000	2.18	.398807	57.20
49	.975188	2.22	.230652	40.18	49	.983131	2.18	.402239	57.62
50	9.975321	2.23	1.233063	40.38	50	9.983262	2.20	1.405696	58.07
51	.975455	2.22	.235486	40.58	51	.983394	2.18	.409180	58.48
52	.975588	2.23	.237921	40.78	52	.983525	2.18	.412689	58.93
53	.975722	2.22	.240368	41.00	53	.983656	2.18	.416225	59.38
54	.975855	2.22	.242828	41.20	54	.983787	2.18	.419788	59.83
55	9.975988	2.23	1.245300	41.42	55	9.983918	2.18	1.423378	60.28
56	.976122	2.22	.247785	41.63	56	.984049	2.18	.426995	60.77
57	.976255	2.22	.250283	41.83	57	.984180	2.18	.430641	61.25
58	.976388	2.22	.252793	42.07	58	.984311	2.18	.434316	61.73
59	.976521	2.22	.255317	42.28	59	.984442	2.18	.438020	62.22
60	9.976654		1.257854		60	9.984573		1.441753	

TABLE XV.—LOGARITHMIC VERSINES AND EXSECANTS.

88°					89°				
M.	Vers.	D. 1″.	Exsec.	D. 1″.	M.	Vers.	D. 1″.	Exsec.	D. 1″.
0	9.984573	2.17	1.441753	62.73	0	9.992354	2.13	1.750498	123.78
1	.984703	2.18	.445517	63.23	1	.992482	2.15	.757925	125.87
2	.984834	2.18	.449311	63.77	2	.992611	2.13	.765477	128.02
3	.984965	2.18	.453137	64.28	3	.992739	2.15	.773158	130.25
4	.985096	2.17	.456994	64.82	4	.992868	2.13	.780973	132.55
5	9.985226	2.18	1.460883	65.37	5	9.992996	2.13	1.788926	134.93
6	.985357	2.17	.464805	65.93	6	.993124	2.15	.797022	137.43
7	.985487	2.18	.468761	66.50	7	.993253	2.13	.805268	140.00
8	.985618	2.17	.472751	67.07	8	.993381	2.13	.813668	142.68
9	.985748	2.18	.476775	67.65	9	.993509	2.13	.822229	145.45
10	9.985879	2.17	1.480834	68.25	10	9.993637	2.13	1.830956	148.37
11	.986009	2.18	.484929	68.87	11	.993765	2.15	.839858	151.37
12	.986140	2.17	.489061	69.48	12	.993894	2.13	.848940	154.52
13	.986270	2.17	.493230	70.12	13	.994022	2.13	.858211	157.80
14	.986400	2.18	.497437	70.77	14	.994150	2.13	.867679	161.20
15	9.986531	2.17	1.501683	71.42	15	9.994278	2.13	1.877351	164.80
16	.986661	2.17	.505968	72.08	16	.994406	2.13	.887239	168.52
17	.986791	2.17	.510293	72.77	17	.994534	2.13	.897350	172.45
18	.986921	2.17	.514659	73.45	18	.994662	2.12	.907697	176.55
19	.987051	2.17	.519066	74.17	19	.994789	2.13	.918290	180.85
20	9.987181	2.17	1.523516	74.90	20	9.994917	2.13	1.929141	185.38
21	.987311	2.17	.528010	75.63	21	.995045	2.13	.940264	190.13
22	.987441	2.17	.532548	76.38	22	.995173	2.13	.951672	195.15
23	.987571	2.17	.537131	77.15	23	.995301	2.12	.963381	200.45
24	.987701	2.17	.541760	77.95	24	.995428	2.13	.975408	206.02
25	9.987831	2.17	1.546437	78.73	25	9.995556	2.12	1.987769	211.93
26	.987961	2.17	.551161	79.57	26	.995683	2.13	2.000485	218.22
27	.988091	2.17	.555935	80.40	27	.995811	2.13	.013578	224.85
28	.988221	2.15	.560759	81.25	28	.995939	2.12	.027069	231.92
29	.988350	2.17	.565634	82.12	29	.996066	2.12	.040984	239.47
30	9.988480	2.17	1.570561	83.02	30	9.996193	2.13	2.055352	247.50
31	.988610	2.15	.575542	83.93	31	.996321	2.12	.070202	256.12
32	.988739	2.17	.580578	84.87	32	.996448	2.13	.085569	265.35
33	.988869	2.15	.585670	85.82	33	.996576	2.12	.101490	275.30
34	.988998	2.17	.590819	86.80	34	.996703	2.12	.118008	286.00
35	9.989128	2.15	1.596027	87.80	35	9.996830	2.12	2.135168	297.60
36	.989257	2.17	.601295	88.83	36	.996957	2.13	.153024	310.17
37	.989387	2.15	.606625	89.88	37	.997085	2.12	.171634	323.87
38	.989516	2.17	.612018	90.95	38	.997212	2.12	.191066	338.83
39	.989646	2.15	.617475	92.05	39	.997339	2.12	.211396	355.27
40	9.989775	2.15	1.622998	93.18	40	9.997466	2.12	2.232712	373.40
41	.989904	2.17	.628589	94.35	41	.997593	2.12	.255116	393.45
42	.990034	2.15	.634250	95.53	42	.997720	2.12	.278723	415.85
43	.990163	2.15	.639982	96.77	43	.997847	2.12	.303674	440.9
44	.990292	2.15	.645788	98.00	44	.997974	2.12	.330129	469.27
45	9.990421	2.15	1.651668	99.30	45	9.998101	2.12	2.358285	501.50
46	.990550	2.15	.657626	100.62	46	.998228	2.12	.388375	538.5
47	.990679	2.15	.663663	101.97	47	.998355	2.10	.420686	581.48
48	.990808	2.15	.669781	103.38	48	.998481	2.12	.455575	631.9
49	.990937	2.15	.675984	104.80	49	.998608	2.12	.493490	691.98
50	9.991066	2.15	1.682272	106.28	50	9.998735	2.12	2.535009	764.73
51	.991195	2.15	.688649	107.80	51	.998862	2.10	.580893	854.65
52	.991324	2.15	.695117	109.37	52	.998988	2.12	.632172	968.65
53	.991453	2.15	.701679	110.98	53	.999115	2.10	.690291	1117.88
54	.991582	2.13	.708338	112.65	54	.999241	2.12	.757364	1321.80
55	9.991710	2.15	1.715097	114.35	55	9.999368	2.10	2.836672	1617.27
56	.991839	2.15	.721958	116.12	56	.999494	2.12	.933708	2084.43
57	.991968	2.13	.728925	117.95	57	.999621	2.10	3.058774	2936.9
58	.992096	2.15	.736002	119.83	58	.999747	2.12	.234991	5019.2
59	.992225	2.15	.743192	121.77	59	.999874	2.10	.536148	
60	9.992354		1.750498		60	0.000000		∞	

TABLE XVI.—AUXILIARY; VERS. & EXSEC. OF SMALL ANGL

M.	0°			1°			2°		
	S.	Vers.	Exsec.	S.	Vers.	Exsec.	S.	Vers.	Exsec.
		9.07			9.07			9.07	
0	0	0120	0120	3600	0109	0175	7200	0076	0340
1	60	0120	0120	3660	0108	0177	7260	0075	0344
2	120	0120	0120	3720	0108	0179	7320	0074	0348
3	180	0120	0120	3780	0108	0181	7380	0073	0351
4	240	0120	0120	3840	0107	0182	7440	0073	0355
5	300	0120	0120	3900	0107	0184	7500	0072	0359
6	360	0120	0120	3960	0106	0186	7560	0071	0363
7	420	0120	0120	4020	0106	0188	7620	0070	0367
8	480	0120	0121	4080	0106	0191	7680	0070	0371
9	540	0119	0121	4140	0105	0193	7740	0069	0375
10	600	0119	0121	4200	0105	0195	7800	0068	0379
11	660	0119	0122	4260	0104	0197	7860	0067	0383
12	720	0119	0122	4320	0104	0199	7920	0066	0387
13	780	0119	0122	4380	0103	0201	7980	0066	0391
14	840	0119	0123	4440	0103	0204	8040	0065	0395
15	900	0119	0123	4500	0103	0206	8100	0064	0399
16	960	0119	0124	4560	0102	0208	8160	0063	0403
17	1020	0119	0124	4620	0102	0211	8220	0062	0407
18	1080	0119	0125	4680	0101	0213	8280	0061	0411
19	1140	0119	0125	4740	0101	0215	8340	0061	0416
20	1200	0119	0126	4800	0100	0218	8400	0060	0420
21	1260	0118	0126	4860	0100	0220	8460	0059	0424
22	1320	0118	0127	4920	0099	0223	8520	0058	0429
23	1380	0118	0128	4980	0099	0225	8580	0057	0433
24	1440	0118	0129	5040	0098	0228	8640	0056	0437
25	1500	0118	0129	5100	0098	0230	8700	0055	0442
26	1560	0118	0130	5160	0097	0233	8760	0054	0446
27	1620	0118	0131	5220	0097	0236	8820	0054	0451
28	1680	0117	0132	5280	0096	0238	8880	0053	0455
29	1740	0117	0133	5340	0095	0241	8940	0052	0460
30	1800	0117	0134	5400	0095	0244	9000	0051	0464
31	1860	0117	0134	5460	0094	0247	9060	0050	0469
32	1920	0117	0135	5520	0094	0249	9120	0049	0474
33	1980	0116	0136	5580	0093	0252	9180	0048	0478
34	2040	0116	0137	5640	0093	0255	9240	0047	0483
35	2100	0116	0138	5700	0092	0258	9300	0046	0488
36	2160	0116	0140	5760	0092	0261	9360	0045	0493
37	2220	0116	0141	5820	0091	0264	9420	0044	0497
38	2280	0115	0142	5880	0090	0267	9480	0043	0502
39	2340	0115	0143	5940	0090	0270	9540	0042	0507
40	2400	0115	0144	6000	0089	0273	9600	0041	0512
41	2460	0115	0145	6060	0088	0276	9660	0040	0517
42	2520	0114	0147	6120	0088	0279	9720	0039	0522
43	2580	0114	0148	6180	0087	0282	9780	0038	0527
44	2640	0114	0149	6240	0087	0285	9840	0037	0532
45	2700	0114	0151	6300	0086	0289	9900	0036	0537
46	2760	0113	0152	6360	0085	0292	9960	0035	0542
47	2820	0113	0154	6420	0085	0295	10020	0034	0547
48	2880	0113	0155	6480	0084	0298	10080	0033	0552
49	2940	0112	0157	6540	0083	0302	10140	0032	0557
50	3000	0112	0158	6600	0083	0305	10200	0031	0562
51	3060	0112	0160	6660	0082	0308	10260	0030	0568
52	3120	0111	0161	6720	0081	0312	10320	0029	0573
53	3180	0111	0163	6780	0081	0315	10380	0028	0578
54	3240	0111	0164	6840	0080	0319	10440	0027	0584
55	3300	0110	0166	6900	0079	0322	10500	0026	0589
56	3360	0110	0168	6960	0079	0326	10560	0025	0594
57	3420	0110	0169	7020	0078	0329	10620	0024	0600
58	3480	0109	0171	7080	0077	0333	10680	0023	0605
59	3540	0109	0173	7140	0076	0337	10740	0022	0611
M.	S.	Vers.	Exsec.	S.	Vers.	Exsec.	S.	Vers.	Exsec.

ABLE XVI.—AUXILIARY; VERS. & EXSEC. OF SMALL ANGLES.

3°			4°			5°			
S.	Vers.	Exsec.	S.	Vers.	Exsec.	S.	Vers.	Exsec.	M.
	9.07			9.06	9.07		9.06	9.07	
10800	0021	0616	14400	9943	1003	18000	9844	1500	0
10860	0019	0622	14460	9942	1010	18060	9842	1509	1
10920	0018	0627	14520	9940	1017	18120	9840	1518	2
10980	0017	0633	14580	9939	1025	18180	9839	1528	3
11040	0016	0638	14640	9937	1032	18240	9837	1537	4
11100	0015	0644	14700	9936	1040	18300	9835	1546	5
11160	0014	0650	14760	9934	1047	18360	9833	1556	6
11220	0013	0655	14820	9933	1055	18420	9831	1565	7
11280	0011	0661	14880	9931	1062	18480	9829	1575	8
11340	0010	0667	14940	9930	1070	18540	9827	1585	9
11400	0009	0673	15000	9928	1078	18600	9825	1594	10
11460	0008	0679	15060	9927	1085	18660	9824	1603	11
11520	0007	0685	15120	9925	1093	18720	9822	1613	12
11580	0006	0690	15180	9924	1101	18780	9820	1622	13
11640	0004	0696	15240	9922	1109	18840	9818	1632	14
11700	0003	0702	15300	9921	1116	18900	9816	1642	15
11760	0002	0708	15360	9919	1124	18960	9814	1651	16
11820	0001	0714	15420	9917	1132	19020	9812	1661	17
11880	0000	0720	15480	9916	1140	19080	9810	1671	18
11940	*9998	0727	15540	9914	1148	19140	9808	1681	19
12000	9997	0733	15600	9913	1156	19200	9806	1690	20
12060	9996	0739	15660	9911	1164	19260	9804	1700	21
12120	9995	0745	15720	9910	1172	19320	9802	1710	22
12180	9994	0751	15780	9908	1180	19380	9800	1720	23
12240	9992	0757	15840	9906	1188	19440	9798	1730	24
12300	9991	0764	15900	9905	1196	19500	9796	1740	25
12360	9990	0770	15960	9903	1204	19560	9794	1750	26
12420	9989	0776	16020	9901	1213	19620	9792	1760	27
12480	9987	0783	16080	9900	1221	19680	9790	1770	28
12540	9986	0789	16140	9898	1229	19740	9788	1780	29
12600	9985	0795	16200	9896	1237	19800	9786	1790	30
12660	9983	0802	16260	9895	1246	19860	9784	1800	31
12720	9982	0808	16320	9893	1254	19920	9782	1811	32
12780	9981	0815	16380	9891	1262	19980	9780	1821	33
12840	9979	0821	16440	9890	1271	20040	9778	1831	34
12900	9978	0828	16500	9888	1279	20100	9776	1841	35
12960	9977	0835	16560	9886	1288	20160	9774	1852	36
13020	9976	0841	16620	9885	1296	20220	9772	1862	37
13080	9974	0848	16680	9883	1305	20280	9770	1872	38
13140	9973	0855	16740	9881	1313	20340	9768	1883	39
13200	9972	0861	16800	9880	1322	20400	9766	1893	40
13260	9970	0868	16860	9878	1330	20460	9764	1904	41
13320	9969	0875	16920	9876	1339	20520	9762	1914	42
13380	9967	0882	16980	9874	1348	20580	9759	1925	43
13440	9966	0889	17040	9873	1356	20640	9757	1935	44
13500	9965	0896	17100	9871	1365	20700	9755	1946	45
13560	9963	0902	17160	9869	1374	20760	9753	1956	46
13620	9962	0909	17220	9867	1383	20820	9751	1967	47
13680	9961	0916	17280	9866	1392	20880	9749	1978	48
13740	9959	0923	17340	9864	1400	20940	9747	1988	49
13800	9958	0930	17400	9862	1409	21000	9745	1999	50
13860	9956	0938	17460	9860	1418	21060	9742	2010	51
13920	9955	0945	17520	9859	1427	21120	9740	2021	52
13980	9953	0952	17580	9857	1436	21180	9738	2032	53
14040	9952	0959	17640	9855	1445	21240	9736	2043	54
14100	9951	0966	17700	9853	1454	21300	9734	2053	55
14160	9949	0973	17760	9851	1463	21360	9732	2064	56
14220	9948	0981	17820	9850	1472	21420	9729	2075	57
14280	9946	0988	17880	9848	1482	21480	9727	2086	58
14340	9945	0995	17940	9846	1491	21540	9725	2097	59
	9.06*								
S.	Vers.	Exsec.	S.	Vers.	Exsec.	S.	Vers.	Exsec.	M.

TABLE XVII.—NATURAL SINES AND COSINES.

M.	0°		1°		2°		3°		4°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.00000	1.0000	01745	.99985	.03490	.99939	.05234	.99863	.06976	.99756	60
1	029	000	774	984	519	938	263	861	.07005	754	59
2	058	000	803	984	548	937	292	860	034	752	58
3	087	000	832	983	577	936	321	858	063	750	57
4	116	000	862	983	606	935	350	857	092	748	56
5	.00145	1.0000	.01891	.99982	.03635	.99934	.05379	.99855	.07121	.99746	55
6	175	000	920	982	664	933	408	854	150	744	54
7	204	000	949	981	693	932	437	852	179	742	53
8	233	000	978	980	723	931	466	851	208	740	52
9	262	000	.02007	980	752	930	495	849	237	738	51
10	.00291	1.0000	.02036	.99979	.03781	.99929	.05524	.99847	.07266	.99736	50
11	320	.99999	065	979	810	927	553	846	295	734	49
12	349	999	094	978	839	926	582	844	324	731	48
13	378	999	123	977	868	925	611	842	353	729	47
14	407	999	152	977	897	924	640	841	382	727	46
15	.00436	.99999	.02181	.99976	.03926	.99923	.05669	.99839	.07411	.99725	45
16	465	999	211	976	955	922	698	838	440	723	44
17	495	999	240	975	984	921	727	836	469	721	43
18	524	999	269	974	.04013	919	756	834	498	719	42
19	553	998	298	974	042	918	785	833	527	716	41
20	.00582	.99998	.02327	.99973	.04071	.99917	.05814	.99831	.07556	.99714	40
21	611	998	356	972	100	916	844	829	585	712	39
22	640	998	385	972	129	915	873	827	614	710	38
23	669	998	414	971	159	913	902	826	643	708	37
24	698	998	443	970	188	912	931	824	672	705	36
25	.00727	.99997	.02472	.99969	.04217	.99911	.05960	.99822	.07701	.99703	35
26	756	997	501	969	246	910	989	821	730	701	34
27	785	997	530	968	275	909	.06018	819	759	699	33
28	814	997	560	967	304	907	047	817	788	696	32
29	844	996	589	966	333	906	076	815	817	694	31
30	.00873	.99996	.02618	.99966	.04362	.99905	.06105	.99813	.07846	.99692	30
31	902	996	647	965	391	904	134	812	875	689	29
32	931	996	676	964	420	902	163	810	904	687	28
33	960	995	705	963	449	901	192	808	933	685	27
34	989	995	734	963	478	900	221	806	962	683	26
35	.01018	.99995	.02763	.99962	.04507	.99898	.06250	.99804	.07991	.99680	25
36	047	995	792	961	536	897	279	803	.08020	678	24
37	076	994	821	960	565	896	308	801	049	676	23
38	105	994	850	959	594	894	337	799	078	673	22
39	134	994	879	959	623	893	366	797	107	671	21
40	.01164	.99993	.02908	.99958	.04653	.99892	.06395	.99795	.08136	.99668	20
41	193	993	938	957	682	890	424	793	165	666	19
42	222	993	967	956	711	889	453	792	194	664	18
43	251	992	996	955	740	888	482	790	223	661	17
44	280	992	.03025	954	769	886	511	788	252	659	16
45	.01309	.99991	.03054	.99953	.04798	.99885	.06540	.99786	.08281	.99657	15
46	338	991	083	952	827	883	569	784	310	654	14
47	367	991	112	952	856	882	598	782	339	652	13
48	396	990	141	951	885	881	627	780	368	649	12
49	425	990	170	950	914	879	656	778	397	647	11
50	.01454	.99989	.03199	.99949	.04943	.99878	.06685	.99776	.08426	.99644	10
51	484	989	228	948	972	876	714	774	455	642	9
52	513	989	257	947	.05001	875	743	772	484	639	8
53	542	988	286	946	030	873	773	770	513	637	7
54	571	988	316	945	059	872	802	768	542	635	6
55	.01600	.99987	.03345	.99944	.05088	.99870	.06831	.99766	.08571	.99632	5
56	629	987	374	943	117	869	860	764	600	630	4
57	658	986	403	942	146	867	889	762	629	627	3
58	687	986	.432	941	175	866	918	760	658	625	2
59	716	985	461	940	205	864	947	758	687	622	1
60	.01745	.99985	.03490	.99939	.05234	.99863	.06976	.99756	.08716	.99619	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	M.
	89°		88°		87°		86°		85°		

TABLE XVII.—NATURAL SINES AND COSINES.

M.	5°		6°		7°		8°		9°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.08716	.99619	.10453	.99452	.12187	.99255	.13917	.99027	.15643	.98769	60
1	745	617	482	449	216	251	946	023	672	764	59
2	774	614	511	446	245	248	975	019	701	760	58
3	803	612	540	443	274	244	.14004	015	730	755	57
4	831	609	569	440	302	240	033	011	758	751	56
5	.08860	.99607	.10597	.99437	.12331	.99237	.14061	.99006	.15787	.98746	55
6	889	604	626	434	360	233	090	002	816	741	54
7	918	602	655	431	389	230	119	.98998	845	737	53
8	947	599	684	428	418	226	148	994	873	732	52
9	976	596	713	424	447	222	177	990	902	728	51
10	.09005	.99594	.10742	.99421	.12476	.99219	.14205	.98986	.15931	.98723	50
11	034	591	771	418	504	215	234	982	959	718	49
12	063	588	800	415	533	211	263	978	988	714	48
13	092	586	829	412	562	208	292	973	.16017	709	47
14	121	583	858	409	591	204	320	969	046	704	46
15	.09150	.99580	.10887	.99406	.12620	.99200	.14349	.98965	.16074	.98700	45
16	179	578	916	402	649	197	378	961	103	695	44
17	208	575	945	399	678	193	407	957	132	690	43
18	237	572	973	396	706	189	436	953	160	686	42
19	266	570	.11002	393	735	186	464	948	189	681	41
20	.09295	.99567	.11031	.99390	.12764	.99182	.14493	.98944	.16218	.98676	40
21	324	564	060	386	793	178	522	940	246	671	39
22	353	562	089	383	822	175	551	936	275	667	38
23	382	559	118	380	851	171	580	931	304	662	37
24	411	556	147	377	880	167	608	927	333	657	36
25	.09440	.99553	.11176	.99374	.12908	.99163	.14637	.98923	.16361	.98652	35
26	469	551	205	370	937	160	666	919	390	648	34
27	498	548	234	367	966	156	695	914	419	643	33
28	527	545	263	364	995	152	723	910	447	638	32
29	556	542	291	360	.13024	148	752	906	476	633	31
30	.09585	.99540	.11320	.99357	.13053	.99144	.14781	.98902	.16505	.98629	30
31	614	537	349	354	081	141	810	897	533	624	29
32	642	534	378	351	110	137	838	893	562	619	28
33	671	531	407	347	139	133	867	889	591	614	27
34	700	528	436	344	168	129	896	884	620	609	26
35	.09729	.99526	.11465	.99341	.13197	.99125	.14925	.98880	.16648	.98604	25
36	758	523	494	337	226	122	954	876	677	600	24
37	787	520	523	334	254	118	982	871	706	595	23
38	816	517	552	331	283	114	.15011	867	734	590	22
39	845	514	580	327	312	110	040	863	763	585	21
40	.09874	.99511	.11609	.99324	.13341	.99106	.15069	.98858	.16792	.98580	20
41	903	508	638	320	370	102	097	854	820	575	19
42	932	506	667	317	399	098	126	849	849	570	18
43	961	503	696	314	427	094	155	845	878	565	17
44	990	500	725	310	456	091	184	841	906	561	16
45	.10019	.99497	.11754	.99307	.13485	.99087	.15212	.98836	.16935	.98556	15
46	048	494	783	303	514	083	241	832	964	551	14
47	077	491	812	300	543	079	270	827	992	546	13
48	106	488	840	297	572	075	299	823	.17021	541	12
49	135	485	869	293	600	071	327	818	050	536	11
50	.10164	.99482	.11898	.99290	.13629	.99067	.15356	.98814	.17078	.98531	10
51	192	479	927	286	658	063	385	809	107	526	9
52	221	476	956	283	687	059	414	805	136	521	8
53	250	473	985	279	716	055	442	800	164	516	7
54	279	470	.12014	276	744	051	471	796	193	511	6
55	.10308	.99467	.12043	.99272	.13773	.99047	.15500	.98791	.17222	.98506	5
56	337	464	071	269	802	043	529	787	250	501	4
57	366	461	100	265	831	039	557	782	279	496	3
58	395	458	129	262	860	035	586	778	308	491	2
59	424	455	158	258	889	031	615	773	336	486	1
60	.10453	.99452	.12187	.99255	.13917	.99027	.15643	.98769	.17365	.98481	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin	
	84°		83°		82°		81°		80°		M.

TABLE XVII.—NATURAL SINES AND COSINES.

M.	10°		11°		12°		13°		14°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.17365	.98481	.19081	.98163	.20791	.97815	.22495	.97437	.24192	.97030	60
1	393	476	109	157	820	809	523	430	220	023	59
2	422	471	138	152	848	803	552	424	249	015	58
3	451	466	167	146	877	797	580	417	277	008	57
4	479	461	195	140	905	791	608	411	305	001	56
5	.17508	.98455	.19224	.98135	.20933	.97784	.22637	.97404	.24333	.96994	55
6	537	450	252	129	962	778	665	398	362	987	54
7	565	445	281	124	990	772	693	391	390	980	53
8	594	440	309	118	.21019	766	722	384	418	973	52
9	623	435	338	112	047	760	750	378	446	966	51
10	.17651	.98430	.19366	.98107	.21076	.97754	.22778	.97371	.24474	.96959	50
11	680	425	395	101	104	748	807	365	503	952	49
12	708	420	423	096	132	742	835	358	531	945	48
13	737	414	452	090	161	735	863	351	559	937	47
14	766	409	481	084	189	729	892	345	587	930	46
15	.17794	.98404	.19509	.98079	.21218	.97723	.22920	.97338	.24615	.96923	45
16	823	399	538	073	246	717	948	331	644	916	44
17	852	394	566	067	275	711	977	325	672	909	43
18	880	389	595	061	303	705	.23005	318	700	902	42
19	909	383	623	056	331	698	033	311	728	894	41
20	.17937	.98378	.19652	.98050	.21360	.97692	.23062	.97304	.24756	.96887	40
21	966	373	680	044	388	686	090	298	784	880	39
22	995	368	709	039	417	680	118	291	813	873	38
23	.18023	362	737	033	445	673	146	284	841	866	37
24	052	357	766	027	474	667	175	278	869	858	36
25	.18081	.98352	.19794	.98021	.21502	.97661	.23203	.97271	.24897	.96851	35
26	109	347	823	016	530	655	231	264	925	844	34
27	138	341	851	010	559	648	260	257	954	837	33
28	166	336	880	004	587	642	288	251	982	829	32
29	195	331	908	.97998	616	636	316	244	.25010	822	31
30	.18224	.98325	.19937	.97992	.21644	.97630	.23345	.97237	.25038	.96815	30
31	252	320	965	987	672	623	373	230	066	807	29
32	281	315	994	981	701	617	401	223	094	800	28
33	309	310	.20022	975	729	611	429	217	122	793	27
34	338	304	051	969	758	604	458	210	151	786	26
35	.18367	.98299	.20079	.97963	.21786	.97598	.23486	.97203	.25179	.96778	25
36	395	294	108	958	814	592	514	196	207	771	24
37	424	288	136	952	843	585	542	189	235	764	23
38	452	283	165	946	871	579	571	182	263	756	22
39	481	277	193	940	899	573	599	176	291	749	21
40	.18509	.98272	.20222	.97934	.21928	.97566	.23627	.97169	.25320	.96742	20
41	538	267	250	928	956	560	656	162	348	734	19
42	567	261	279	922	985	553	684	155	376	727	18
43	595	256	307	916	.22013	547	712	148	404	719	17
44	624	250	336	910	041	541	740	141	432	712	16
45	.18652	.98245	.20364	.97905	.22070	.97534	.23769	.97134	.25460	.96705	15
46	681	240	393	899	098	528	797	127	488	697	14
47	710	234	421	893	126	521	825	120	516	690	13
48	738	229	450	887	155	515	853	113	545	682	12
49	767	223	478	881	183	508	882	106	573	675	11
50	.18795	.98218	.20507	.97875	.22212	.97502	.23910	.97100	.25601	.96667	10
51	824	212	535	869	240	496	938	093	629	660	9
52	852	207	563	863	268	489	966	086	657	653	8
53	881	201	592	857	297	483	995	079	685	645	7
54	910	196	620	851	325	476	.24023	072	713	638	6
55	.18938	.98190	.20649	.97845	.22353	.97470	.24051	.97065	.25741	.96630	5
56	967	185	677	839	382	463	079	058	769	623	4
57	995	179	706	833	410	457	108	051	798	615	3
58	.19024	174	734	827	438	450	136	044	826	608	2
59	052	168	763	821	467	444	164	037	854	600	1
60	.19081	.98163	.20791	.97815	.22495	.97437	.24192	.97030	.25882	.96593	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	M.
	79°		78°		77°		76°		75°		

TABLE XVII.—NATURAL SINES AND COSINES.

M.	15°		16°		17°		18°		19°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.25882	.96593	.27564	.96126	.29237	.95630	.30902	.95106	.32557	.94552	60
1	910	585	592	118	265	622	929	097	584	542	59
2	938	578	620	110	293	613	957	088	612	533	58
3	966	570	648	102	321	605	985	079	639	523	57
4	994	562	676	094	348	596	.31012	070	667	514	56
5	.26022	.96555	.27704	.96086	.29376	.95588	.31040	.95061	.32694	.94504	55
6	050	547	731	078	404	579	068	052	722	495	54
7	079	540	759	070	432	571	095	043	749	485	53
8	107	532	787	062	460	562	123	033	777	476	52
9	135	524	815	054	487	554	151	024	804	466	51
10	.26163	.96517	.27843	.96046	.29515	.95545	.31178	.95015	.32832	.94457	50
11	191	509	871	037	543	536	206	006	859	447	49
12	219	502	899	029	571	528	233	.94997	887	438	48
13	247	494	927	021	599	519	261	988	914	428	47
14	275	486	955	013	626	511	289	979	942	418	46
15	.26303	.96479	.27983	.96005	.29654	.95502	.31316	.94970	.32969	.94409	45
16	331	471	.28011	.95997	682	493	344	961	997	399	44
17	359	463	039	989	710	485	372	952	.33024	390	43
18	387	456	067	981	737	476	399	943	051	380	42
19	415	448	095	972	765	467	427	933	079	370	41
20	.26443	.96440	.28123	.95964	.29793	.95459	.31454	.94924	.33106	.94361	40
21	471	433	150	956	821	450	482	915	134	351	39
22	500	425	178	948	849	441	510	906	161	342	38
23	528	417	206	940	876	433	537	897	189	332	37
24	556	410	234	931	904	424	565	888	216	322	36
25	.26584	.96402	.28262	.95923	.29932	.95415	.31593	.94878	.33244	.94313	35
26	612	394	290	915	960	407	620	869	271	303	34
27	640	386	318	907	987	398	648	860	298	293	33
28	668	379	346	898	.30015	389	675	851	326	284	32
29	696	371	374	890	043	380	703	842	353	274	31
30	.26724	.96363	.28402	.95882	.30071	.95372	.31730	.94832	.33381	.94264	30
31	752	355	429	874	098	363	758	823	408	254	29
32	780	347	457	865	126	354	786	814	436	245	28
33	808	340	485	857	154	345	813	805	463	235	27
34	836	332	513	849	182	337	841	795	490	225	26
35	.26864	.96324	.28541	.95841	.30209	.95328	.31868	.94786	.33518	.94215	25
36	892	316	569	832	237	319	896	777	545	206	24
37	920	308	597	824	265	310	923	768	573	196	23
38	948	301	625	816	292	301	951	758	600	186	22
39	976	293	652	807	320	293	979	749	627	176	21
40	.27004	.96285	.28680	.95799	.30348	.95284	.32006	.94740	.33655	.94167	20
41	032	277	708	791	376	275	034	730	682	157	19
42	060	269	736	782	403	266	061	721	710	147	18
43	088	261	764	774	431	257	089	712	737	137	17
44	116	253	792	766	459	248	116	702	764	127	16
45	.27144	.96246	.28820	.95757	.30486	.95240	.32144	.94693	.33792	.94118	15
46	172	238	847	749	514	231	171	684	819	108	14
47	200	230	875	740	542	222	199	674	846	098	13
48	228	222	903	732	570	213	227	665	874	088	12
49	256	214	931	724	597	204	254	656	901	078	11
50	.27284	.96206	.28959	.95715	.30625	.95195	.32282	.94646	.33929	.94068	10
51	312	198	987	707	653	186	309	637	956	058	9
52	340	190	.29015	698	680	177	337	627	983	049	8
53	368	182	042	690	708	168	364	618	.34011	039	7
54	396	174	070	681	736	159	392	609	038	029	6
55	.27424	.96166	.29098	.95673	.30763	.95150	.32419	.94599	.34065	.94019	5
56	452	158	126	664	791	142	447	590	093	009	4
57	480	150	154	656	819	133	474	580	120	.93999	3
58	508	142	182	647	846	124	502	571	147	989	2
59	536	134	209	639	874	115	529	561	175	979	1
60	.27564	.96126	.29237	.95630	.30902	.95106	.32557	.94552	.34202	.93969	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	M.
	74°		73°		72°		71°		70°		

TABLE XVII.—NATURAL SINES AND COSINES.

M.	20°		21°		22°		23°		24°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.34202	.93969	.35837	.93358	.37461	.92718	.39073	.92050	.40674	.91355	60
1	229	959	864	348	488	707	100	039	700	343	59
2	257	949	891	337	515	697	127	028	727	331	58
3	284	939	918	327	542	686	153	016	753	319	57
4	311	929	945	316	569	675	180	005	780	307	56
5	.34339	.93919	.35973	.93306	.37595	.92664	.39207	.91994	.40806	.91295	55
6	366	909	.36000	295	622	653	234	982	833	283	54
7	393	899	027	285	649	642	260	971	860	272	53
8	421	889	054	274	676	631	287	959	886	260	52
9	448	879	081	264	703	620	314	948	913	248	51
10	.34475	.93869	.36108	.93253	.37730	.92609	.39341	.91936	.40939	.91236	50
11	503	859	135	243	757	598	367	925	966	224	49
12	530	849	162	232	784	587	394	914	992	212	48
13	557	839	190	222	811	576	421	902	.41019	200	47
14	584	829	217	211	838	565	448	891	045	188	46
15	.34612	.93819	.36244	.93201	.37865	.92554	.39474	.91879	.41072	.91176	45
16	639	809	271	190	892	543	501	868	098	164	44
17	666	799	298	180	919	532	528	856	125	152	43
18	694	789	325	169	946	521	555	845	151	140	42
19	721	779	352	159	973	510	581	833	178	128	41
20	.34748	.93769	.36379	.93148	.37999	.92499	.39608	.91822	.41204	.91116	40
21	775	759	406	137	.38026	488	635	810	231	104	39
22	803	748	434	127	053	477	661	799	257	092	38
23	830	738	461	116	080	466	688	787	284	080	37
24	857	728	488	106	107	455	715	775	310	068	36
25	.34884	.93718	.36515	.93095	.38134	.92444	.39741	.91764	.41337	.91056	35
26	912	708	542	084	161	432	768	752	363	044	34
27	939	698	569	074	188	421	795	741	390	032	33
28	966	688	596	063	215	410	822	729	416	020	32
29	993	677	623	052	241	399	848	718	443	008	31
30	.35021	.93667	.36650	.93042	.38268	.92388	.39875	.91706	.41469	.90996	30
31	048	657	677	031	295	377	902	694	496	984	29
32	075	647	704	020	322	366	928	683	522	972	28
33	102	637	731	010	349	355	955	671	549	960	27
34	130	626	758	.92999	376	343	982	660	575	948	26
35	.35157	.93616	.36785	.92988	.38403	.92332	.40008	.91648	.41602	.90936	25
36	184	606	812	978	430	321	035	636	628	924	24
37	211	596	839	967	456	310	062	625	655	911	23
38	239	585	867	956	483	299	088	613	681	899	22
39	266	575	894	945	510	287	115	601	707	887	21
40	.35293	.93565	.36921	.92935	.38537	.92276	.40141	.91590	.41734	.90875	20
41	320	555	948	924	564	265	168	578	760	863	19
42	347	544	975	913	591	254	195	566	787	851	18
43	375	534	.37002	902	617	243	221	555	813	839	17
44	402	524	029	892	644	231	248	543	840	826	16
45	.35429	.93514	.37056	.92881	.38671	.92220	.40275	.91531	.41866	.90814	15
46	456	503	083	870	698	209	301	519	892	802	14
47	484	493	110	859	725	198	328	508	919	790	13
48	511	483	137	849	752	186	355	496	945	778	12
49	538	472	164	838	778	175	381	484	972	766	11
50	.35565	.93462	.37191	.92827	.38805	.92164	.40408	.91472	.41998	.90753	10
51	592	452	218	816	832	152	434	461	.42024	741	9
52	619	441	245	805	859	141	461	449	051	729	8
53	647	431	272	794	886	130	488	437	077	717	7
54	674	420	299	784	912	119	514	425	104	704	6
55	.35701	.93410	.37326	.92773	.38939	.92107	.40541	.91414	.42130	.90692	5
56	728	400	353	762	966	096	567	402	156	680	4
57	755	389	380	751	993	085	594	390	183	668	3
58	782	379	407	740	.39020	073	621	378	209	655	2
59	810	368	434	729	046	062	647	366	235	643	1
60	.35837	.93358	.37461	.92718	.39073	.92050	.40674	.91355	.42262	.90631	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	M.
	69°		68°		67°		66°		65°		

TABLE XVII.—NATURAL SINES AND COSINES.

M.	25°		26°		27°		28°		29°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.42262	.90631	.43837	.89879	.45399	.89101	.46947	.88295	.48481	.87462	60
1	288	618	863	867	425	087	973	281	506	448	59
2	315	606	889	854	451	074	999	267	532	434	58
3	341	594	916	841	477	061	.47024	254	557	420	57
4	367	582	942	828	503	048	050	240	583	406	56
5	.42394	.90569	.43968	.89816	.45529	.89035	.47076	.88226	.48608	.87391	55
6	420	557	994	803	554	021	101	213	634	377	54
7	446	545	.44020	790	580	008	127	199	659	363	53
8	473	532	046	777	606	.88995	153	185	684	349	52
9	499	520	072	764	632	981	178	172	710	335	51
10	.42525	.90507	.44098	.89752	.45658	.88968	.47204	.88158	.48735	.87321	50
11	552	495	124	739	684	955	229	144	761	306	49
12	578	483	151	726	710	942	255	130	786	292	48
13	604	470	177	713	736	928	281	117	811	278	47
14	631	458	203	700	762	915	306	103	837	264	46
15	.42657	.90446	.44229	.89687	.45787	.88902	.47332	.88089	.48862	.87250	45
16	683	433	255	674	813	888	358	075	888	235	44
17	709	421	281	662	839	875	383	062	913	221	43
18	736	408	307	649	865	862	409	048	938	207	42
19	762	396	333	636	891	848	434	034	964	193	41
20	.42788	.90383	.44359	.89623	.45917	.88835	.47460	.88020	.48989	.87178	40
21	815	371	385	610	942	822	486	006	.49014	164	39
22	841	358	411	597	968	808	511	.87993	040	150	38
23	867	346	437	584	994	795	537	979	065	136	37
24	894	334	464	571	.46020	782	562	965	090	121	36
25	.42920	.90321	.44490	.89558	.46046	.88768	.47588	.87951	.49116	.87107	35
26	946	309	516	545	072	755	614	937	141	093	34
27	972	296	542	532	097	741	639	923	166	079	33
28	999	284	568	519	123	728	665	909	192	064	32
29	.43025	271	594	506	149	715	690	896	217	050	31
30	.43051	.90259	.44620	.89493	.46175	.88701	.47716	.87882	.49242	.87036	30
31	077	246	646	480	201	688	741	868	268	021	29
32	104	233	672	467	226	674	767	854	293	007	28
33	130	221	698	454	252	661	793	840	318	.86993	27
34	156	208	724	441	278	647	818	826	344	978	26
35	.43182	.90196	.44750	.89428	.46304	.88634	.47844	.87812	.49369	.86964	25
36	209	183	776	415	330	620	869	798	394	949	24
37	235	171	802	402	355	607	895	784	419	935	23
38	261	158	828	389	381	593	920	770	445	921	22
39	287	146	854	376	407	580	946	756	470	906	21
40	.43313	.90133	.44880	.89363	.46433	.88566	.47971	.87743	.49495	.86892	20
41	340	120	906	350	458	553	997	729	521	878	19
42	366	108	932	337	484	539	.48022	715	546	863	18
43	392	095	958	324	510	526	048	701	571	849	17
44	418	082	984	311	536	512	073	687	596	834	16
45	.43445	.90070	.45010	.89298	.46561	.88499	.48099	.87673	.49622	.86820	15
46	471	057	036	285	587	485	124	659	647	805	14
47	497	045	062	272	613	472	150	645	672	791	13
48	523	032	088	259	639	458	175	631	697	777	12
49	549	019	114	245	664	445	201	617	723	762	11
50	.43575	.90007	.45140	.89232	.46690	.88431	.48226	.87603	.49748	.86748	10
51	602	.89994	166	219	716	417	252	589	773	733	9
52	628	981	192	206	742	404	277	575	798	719	8
53	654	968	218	193	767	390	303	561	824	704	7
54	680	956	243	180	793	377	328	546	849	690	6
55	.43706	.89943	.45269	.89167	.46819	.88363	.48354	.87532	.49874	.86675	5
56	733	930	295	153	844	349	379	518	899	661	4
57	759	918	321	140	870	336	405	504	924	646	3
58	785	905	347	127	896	322	430	490	950	632	2
59	811	892	373	114	921	308	456	476	975	617	1
60	.43837	.89879	.45399	.89101	.46947	.88295	.48481	.87462	.50000	.86603	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	
	64°		63°		62°		61°		60°		M.

M.	30°		31°		32°		33°		3
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.
0	.50000	.86603	.51504	.85717	.52992	.84805	.54464	.83867	.55919
1	025	588	529	702	.53017	789	488	851	943
2	050	573	554	687	041	774	513	835	968
3	076	559	579	672	066	759	537	819	992
4	101	544	604	657	091	743	561	804	.56016
5	.50126	.86530	.51628	.85642	.53115	.84728	.54586	.83788	.56040
6	151	515	653	627	140	712	610	772	064
7	176	501	678	612	164	697	635	756	088
8	201	486	703	597	189	681	659	740	112
9	227	471	728	582	214	666	683	724	136
10	.50252	.86457	.51753	.85567	.53238	.84650	.54708	.83708	.56160
11	277	442	778	551	263	635	732	692	184
12	302	427	803	536	288	619	756	676	208
13	327	413	828	521	312	604	781	660	232
14	352	398	852	506	337	588	805	645	256
15	.50377	.86384	.51877	.85491	.53361	.84573	.54829	.83629	.56280
16	403	369	902	476	386	557	854	613	305
17	428	354	927	461	411	542	878	597	329
18	453	340	952	446	435	526	902	581	353
19	478	325	977	431	460	511	927	565	377
20	.50503	.86310	.52002	.85416	.53484	.84495	.54951	.83549	.56401
21	528	295	026	401	509	480	975	533	425
22	553	281	051	385	534	464	999	517	449
23	578	266	076	370	558	448	.55024	501	473
24	603	251	101	355	583	433	048	485	497
25	.50628	.86237	.52126	.85340	.53607	.84417	.55072	.83469	.56521
26	654	222	151	325	632	402	097	453	545
27	679	207	175	310	656	386	121	437	569
28	704	192	200	294	681	370	145	421	593
29	729	178	225	279	705	355	169	405	617
30	.50754	.86163	.52250	.85264	.53730	.84339	.55194	.83389	.56641
31	779	148	275	249	754	324	218	373	665
32	804	133	299	234	779	308	242	356	689
33	829	119	324	218	804	292	266	340	713
34	854	104	349	203	828	277	291	324	736
35	.50879	.86089	.52374	.85188	.53853	.84261	.55315	.83308	.56760
36	904	074	399	173	877	245	339	292	784
37	929	059	423	157	902	230	363	276	808
38	954	045	448	142	926	214	388	260	832
39	979	030	473	127	951	198	412	244	856
40	.51004	.86015	.52498	.85112	.53975	.84182	.55436	.83228	.56880
41	029	000	522	096	.54000	167	460	212	904
42	054	.85985	547	081	024	151	484	195	928
43	079	970	572	066	049	135	509	179	952
44	104	956	597	051	073	120	533	163	976
45	.51129	.85941	.52621	.85035	.54097	.84104	.55557	.83147	.57000
46	154	926	646	020	122	088	581	131	024
47	179	911	671	005	146	072	605	115	047
48	204	896	696	.84989	171	057	630	098	071
49	229	881	720	974	195	041	654	082	095
50	.51254	.85866	.52745	.84959	.54220	.84025	.55678	.83066	.57119
51	279	851	770	943	244	009	702	050	143
52	304	836	794	928	269	.83994	726	034	167
53	329	821	819	913	293	978	750	017	191
54	354	806	844	897	317	962	775	001	215
55	.51379	.85792	.52869	.84882	.54342	.83946	.55799	.82985	.57238
56	404	777	893	866	366	930	823	969	262
57	429	762	918	851	391	915	847	953	286
58	454	747	943	836	415	899	871	936	310
59	479	732	967	820	440	883	895	920	334
60	.51504	.85717	.52992	.84805	.54464	.83867	.55919	.82904	.57358
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.
	59°		58°		57°		56°		5

TABLE XVII.—NATURAL SINES AND COSINES.

M.	35°		36°		37°		38°		39°		
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	
0	.57358	.81915	.58779	.80902	.60182	.79864	.61566	.78801	.62932	.77715	60
1	381	899	802	885	205	846	589	783	955	696	59
2	405	882	826	867	228	829	612	765	977	678	58
3	429	865	849	850	251	811	635	747	.63000	660	57
4	453	848	873	833	274	793	658	729	022	641	56
5	.57477	.81832	.58896	.80816	.60298	.79776	.61681	.78711	.63045	.77623	55
6	501	815	920	799	321	758	704	694	068	605	54
7	524	798	943	782	344	741	726	676	090	586	53
8	548	782	967	765	367	723	749	658	113	568	52
9	572	765	990	748	390	706	772	640	135	550	51
10	.57596	.81748	.59014	.80730	.60414	.79688	.61795	.78622	.63158	.77531	50
11	619	731	037	713	437	671	818	604	180	513	49
12	643	714	061	696	460	653	841	586	203	494	48
13	667	698	084	679	483	635	864	568	225	476	47
14	691	681	108	662	506	618	887	550	248	458	46
15	.57715	.81664	.59131	.80644	.60529	.79600	.61909	.78532	.63271	.77439	45
16	738	647	154	627	553	583	932	514	293	421	44
17	762	631	178	610	576	565	955	496	316	402	43
18	786	614	201	593	599	547	978	478	338	384	42
19	810	597	225	576	622	530	.62001	460	361	366	41
20	.57833	.81580	.59248	.80558	.60645	.79512	.62024	.78442	.63383	.77347	40
21	857	563	272	541	668	494	046	424	406	329	39
22	881	546	295	524	691	477	069	405	428	310	38
23	904	530	318	507	714	459	092	387	451	292	37
24	928	513	342	489	738	441	115	369	473	273	36
25	.57952	.81496	.59365	.80472	.60761	.79424	.62138	.78351	.63496	.77255	35
26	976	479	389	455	784	406	160	333	518	236	34
27	999	462	412	438	807	388	183	315	540	218	33
28	.58023	445	436	420	830	371	206	297	563	199	32
29	047	428	459	403	853	353	229	279	585	181	31
30	.58070	.81412	.59482	.80386	.60876	.79335	.62251	.78261	.63608	.77162	30
31	094	395	506	368	899	318	274	243	630	144	29
32	118	378	529	351	922	300	297	225	653	125	28
33	141	361	552	334	945	282	320	206	675	107	27
34	165	344	576	316	968	264	342	188	698	088	26
35	.58189	.81327	.59599	.80299	.60991	.79247	.62365	.78170	.63720	.77070	25
36	212	310	622	282	.61015	229	388	152	742	051	24
37	236	293	646	264	038	211	411	134	765	033	23
38	260	276	669	247	061	193	433	116	787	014	22
39	283	259	693	230	084	176	456	098	810	.76996	21
40	.58307	.81242	.59716	.80212	.61107	.79158	.62479	.78079	.63832	.76977	20
41	330	225	739	195	130	140	502	061	854	959	19
42	354	208	763	178	153	122	524	043	877	940	18
43	378	191	786	160	176	105	547	025	899	921	17
44	401	174	809	143	199	087	570	007	922	903	16
45	.58425	.81157	.59832	.80125	.61222	.79069	.62592	.77988	.63944	.76884	15
46	449	140	856	108	245	051	615	970	966	866	14
47	472	123	879	091	268	033	638	952	989	847	13
48	496	106	902	073	291	016	660	934	.64011	828	12
49	519	089	926	056	314	.78998	683	916	033	810	11
50	.58543	.81072	.59949	.80038	.61337	.78980	.62706	.77897	.64056	.76791	10
51	567	055	972	021	360	962	728	879	078	772	9
52	590	038	995	003	383	944	751	861	100	754	8
53	614	021	.60019	.79986	406	926	774	843	123	735	7
54	637	004	042	968	429	908	796	824	145	717	6
55	.58661	.80987	.60065	.79951	.61451	.78891	.62819	.77806	.64167	.76698	5
56	684	970	089	934	474	873	842	788	190	679	4
57	708	953	112	916	497	855	864	769	212	661	3
58	731	936	135	899	520	837	887	751	234	642	2
59	755	919	158	881	543	819	909	733	256	623	1
60	.58779	.80902	.60182	.79864	.61566	.78801	.62932	.77715	.64279	.76604	0
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	
	54°		53°		52°		51°		50°		M.

TABLE XVII.—NATURAL SINES AND COSINES.

M.	40°		41°		42°		43°		44°	
	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.
0	.64279	.76604	.65606	.75471	.66913	.74314	.68200	.73135	.69466	.71934
1	301	586	628	452	935	295	221	116	487	914
2	323	567	650	433	956	276	242	096	508	894
3	346	548	672	414	978	256	264	076	529	873
4	368	530	694	395	999	237	285	056	549	853
5	.64390	.76511	.65716	.75375	.67021	.74217	.68306	.73036	.69570	.71833
6	412	492	738	356	043	198	327	016	591	813
7	435	473	759	337	064	178	349	.72996	612	792
8	457	455	781	318	086	159	370	976	633	772
9	479	436	803	299	107	139	391	957	654	752
10	.64501	.76417	.65825	.75280	.67129	.74120	.68412	.72937	.69675	.71732
11	524	398	847	261	151	100	434	917	696	711
12	546	380	869	241	172	080	455	897	717	691
13	568	361	891	222	194	061	476	877	737	671
14	590	342	913	203	215	041	497	857	758	650
15	.64612	.76323	.65935	.75184	.67237	.74022	.68518	.72837	.69779	.71630
16	635	304	956	165	258	002	539	817	800	610
17	657	286	978	146	280	.73983	561	797	821	590
18	679	267	.66000	126	301	963	582	777	842	569
19	701	248	022	107	323	944	603	757	862	549
20	.64723	.76229	.66044	.75088	.67344	.73924	.68624	.72737	.69883	.71529
21	746	210	066	069	366	904	645	717	904	508
22	768	192	088	050	387	885	666	697	925	488
23	790	173	109	030	409	865	688	677	946	468
24	812	154	131	011	430	846	709	657	966	447
25	.64834	.76135	.66153	.74992	.67452	.73826	.68730	.72637	.69987	.71427
26	856	116	175	973	473	806	751	617	.70008	407
27	878	097	197	953	495	787	772	597	029	386
28	901	078	218	934	516	767	793	577	049	366
29	923	059	240	915	538	747	814	557	070	345
30	.64945	.76041	.66262	.74896	.67559	.73728	.68835	.72537	.70091	.71325
31	967	022	284	876	580	708	857	517	112	305
32	989	003	306	857	602	688	878	497	132	284
33	.65011	.75984	327	838	623	669	899	477	153	264
34	033	965	349	818	645	649	920	457	174	243
35	.65055	.75946	.66371	.74799	.67666	.73629	.68941	.72437	.70195	.71223
36	077	927	393	780	688	610	962	417	215	203
37	100	908	414	760	709	590	983	397	236	182
38	122	889	436	741	730	570	.69004	377	257	162
39	144	870	458	722	752	551	025	357	277	141
40	.65166	.75851	.66480	.74703	.67773	.73531	.69046	.72337	.70298	.71121
41	188	832	501	683	795	511	067	317	319	100
42	210	813	523	664	816	491	088	297	339	080
43	232	794	545	644	837	472	109	277	360	059
44	254	775	566	625	859	452	130	257	381	039
45	.65276	.75756	.66588	.74606	.67880	.73432	.69151	.72236	.70401	.71019
46	298	738	610	586	901	413	172	216	422	.70998
47	320	719	632	567	923	393	193	196	443	978
48	342	700	653	548	944	373	214	176	463	957
49	364	680	675	528	965	353	235	156	484	937
50	.65386	.75661	.66697	.74509	.67987	.73333	.69256	.72136	.70505	.70916
51	408	642	718	489	.68008	314	277	116	525	896
52	430	623	740	470	029	294	298	095	546	875
53	452	604	762	451	051	274	319	075	567	855
54	474	585	783	431	072	254	340	055	587	834
55	.65496	.75566	.66805	.74412	.68093	.73234	.69361	.72035	.70608	.70813
56	518	547	827	392	115	215	382	015	628	793
57	540	528	848	373	136	195	403	.71995	649	772
58	562	509	870	353	157	175	424	974	670	752
59	584	490	891	334	179	155	445	954	690	731
60	.65606	.75471	.66913	.74314	.68200	.73135	.69466	.71934	.70711	.70711
	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.	Cos.	Sin.
	49°		48°		47°		46°		45°	

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	0°		1°		2°		3°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.00000	∞	.01746	57.2900	.03492	28.6363	.05241	19.0811	60
1	029	3437.75	775	56.3506	521	.3994	270	18.9755	59
2	058	1718.87	804	55.4415	550	.1664	299	.8711	58
3	087	1145.92	833	54.5613	579	27.9372	328	.7678	57
4	116	859.436	862	53.7086	609	.7117	357	.6656	56
5	.00145	687.549	.01891	52.8821	.03638	27.4899	.05387	18.5645	55
6	175	572.957	920	52.0807	667	.2715	416	.4645	54
7	204	491.106	949	51.3032	696	.0566	445	.3655	53
8	233	429.718	978	50.5485	725	26.8450	474	.2677	52
9	262	381.971	.02007	49.8157	754	.6367	503	.1708	51
10	.00291	343.774	.02036	49.1039	.03783	26.4316	.05533	18.0750	50
11	320	312.521	066	48.4121	812	.2296	562	17.9802	49
12	349	286.478	095	47.7395	842	.0307	591	.8863	48
13	378	264.441	124	47.0853	871	25.8348	620	.7934	47
14	407	245.552	153	46.4489	900	.6418	649	.7015	46
15	.00436	229.182	.02182	45.8294	.03929	25.4517	.05678	17.6106	45
16	465	214.858	211	45.2261	958	.2644	708	.5205	44
17	495	202.219	240	44.6386	987	.0798	737	.4314	43
18	524	190.984	269	44.0661	.04016	24.8978	766	.3432	42
19	553	180.932	298	43.5081	046	.7185	795	.2558	41
20	.00582	171.885	.02328	42.9641	.04075	24.5418	.05824	17.1693	40
21	611	163.700	357	42.4335	104	.3675	854	.0837	39
22	640	156.259	386	41.9158	133	.1957	883	16.9990	38
23	669	149.465	415	41.4106	162	.0263	912	.9150	37
24	698	143.237	444	40.9174	191	23.8593	941	.8319	36
25	.00727	137.507	.02473	40.4358	.04220	23.6945	.05970	16.7496	35
26	756	132.219	502	39.9655	250	.5321	999	.6681	34
27	785	127.321	531	39.5059	279	.3718	.06029	.5874	33
28	815	122.774	560	39.0568	308	.2137	058	.5075	32
29	844	118.540	589	38.6177	337	.0577	087	.4283	31
30	.00873	114.589	.02619	38.1885	.04366	22.9038	.06116	16.3499	30
31	902	110.892	648	37.7686	395	.7519	145	.2722	29
32	931	107.426	677	37.3579	424	.6020	175	.1952	28
33	960	104.171	706	36.9560	454	.4541	204	.1190	27
34	989	101.107	735	36.5627	483	.3081	233	.0435	26
35	.01018	98.2179	.02764	36.1776	.04512	22.1640	.06262	15.9687	25
36	047	95.4895	793	35.8006	541	.0217	291	.8945	24
37	076	92.9085	822	35.4313	570	21.8813	321	.8211	23
38	105	90.4633	851	35.0695	599	.7426	350	.7483	22
39	135	88.1436	881	34.7151	628	.6056	379	.6762	21
40	.01164	85.9398	.02910	34.3678	.04658	21.4704	.06408	15.6048	20
41	193	83.8435	939	34.0273	687	.3369	438	.5340	19
42	222	81.8470	968	33.6935	716	.2049	467	.4638	18
43	251	79.9434	997	33.3662	745	.0747	496	.3943	17
44	280	78.1263	.03026	33.0452	774	20.9460	525	.3254	16
45	.01309	76.3900	.03055	32.7303	.04803	20.8188	.06554	15.2571	15
46	338	74.7292	084	32.4213	833	.6932	584	.1893	14
47	367	73.1390	114	32.1181	862	.5691	613	.1222	13
48	396	71.6151	143	31.8205	891	.4465	642	.0557	12
49	425	70.1533	172	31.5284	920	.3253	671	14.9898	11
50	.01455	68.7501	.03201	31.2416	.04949	20.2056	.06700	14.9244	10
51	484	67.4019	230	30.9599	978	.0872	730	.8596	9
52	513	66.1055	259	30.6833	.05007	19.9702	759	.7954	8
53	542	64.8580	288	30.4116	037	.8546	788	.7317	7
54	571	63.6567	317	30.1446	066	.7403	817	.6685	6
55	.01600	62.4992	.03346	29.8823	.05095	19.6273	.06847	14.6059	5
56	629	61.3829	376	29.6245	124	.5156	876	.5438	4
57	658	60.3058	405	29.3711	153	.4051	905	.4823	3
58	687	59.2659	434	29.1220	182	.2959	934	.4212	2
59	716	58.2612	463	28.8771	212	.1879	963	.3607	1
60	.01746	57.2900	.03492	28.6363	.05241	19.0811	.06993	14.3007	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	M.
	89°		88°		87°		86°		

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	4°		5°		6°		7°	
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.
0	.06993	14.3007	.08749	11.4301	.10510	9.51436	.12278	8.14435
1	.07022	.2411	778	.3919	540	.48781	308	.12481
2	051	.1821	807	.3540	569	.46141	338	.10536
3	080	.1235	837	.3163	599	.43515	367	.08600
4	110	.0655	866	.2789	628	.40904	397	.06674
5	.07139	14.0079	.08895	11.2417	.10657	9.38307	.12426	8.04756
6	168	13.9507	925	.2048	687	.35724	456	.02848
7	197	.8940	954	.1681	716	.33155	485	.00948
8	227	.8378	983	.1316	746	.30599	515	7.99058
9	256	.7821	.09013	.0954	775	.28058	544	.97176
10	.07285	13.7267	.09042	11.0594	.10805	9.25530	.12574	7.95302
11	314	.6719	071	.0237	834	.23016	603	.93438
12	344	.6174	101	10.9882	863	.20516	633	.91582
13	373	.5634	130	.9529	893	.18028	662	.89734
14	402	.5098	159	.9178	922	.15554	692	.87895
15	.07431	13.4566	.09189	10.8829	.10952	9.13093	.12722	7.86064
16	461	.4039	218	.8483	981	.10646	751	.84242
17	490	.3515	247	.8139	.11011	.08211	781	.82428
18	519	.2996	277	.7797	040	.05789	810	.80622
19	548	.2480	306	.7457	070	.03379	840	.78825
20	.07578	13.1969	.09335	10.7119	.11099	9.00983	.12869	7.77035
21	607	.1461	365	.6783	128	8.98598	899	.75254
22	636	.0958	394	.6450	158	.96227	929	.73480
23	665	.0458	423	.6118	187	.93867	958	.71715
24	695	12.9962	453	.5789	217	.91520	988	.69957
25	.07724	12.9469	.09482	10.5462	.11246	8.89185	.13017	7.68208
26	753	.8981	511	.5136	276	.86862	047	.66466
27	782	.8496	541	.4813	305	.84551	076	.64732
28	812	.8014	570	.4491	335	.82252	106	.63005
29	841	.7536	600	.4172	364	.79964	136	.61287
30	.07870	12.7062	.09629	10.3854	.11394	8.77689	.13165	7.59575
31	899	.6591	658	.3538	423	.75425	195	.57872
32	929	.6124	688	.3224	452	.73172	224	.56176
33	958	.5660	717	.2913	482	.70931	254	.54487
34	987	.5199	746	.2602	511	.68701	284	.52806
35	.08017	12.4742	.09776	10.2294	.11541	8.66482	.13313	7.51132
36	046	.4288	805	.1988	570	.64275	343	.49465
37	075	.3838	834	.1683	600	.62078	372	.47806
38	104	.3390	864	.1381	629	.59893	402	.46154
39	134	.2946	893	.1080	659	.57718	432	.44509
40	.08163	12.2505	.09923	10.0780	.11688	8.55555	.13461	7.42871
41	192	.2067	952	.0483	718	.53402	491	.41240
42	221	.1632	981	.0187	747	.51259	521	.39616
43	251	.1201	.10011	9.98931	777	.49128	550	.37999
44	280	.0772	040	.96007	806	.47007	580	.36389
45	.08309	12.0346	.10069	9.93101	.11836	8.44896	.13609	7.34786
46	339	11.9923	099	.90211	865	.42795	639	.33190
47	368	.9504	128	.87338	895	.40705	669	.31600
48	397	.9087	158	.84482	924	.38625	698	.30018
49	427	.8673	187	.81641	954	.36555	728	.28442
50	.08456	11.8262	.10216	9.78817	.11983	8.34496	.13758	7.26873
51	485	.7853	246	.76009	.12013	.32446	787	.25310
52	514	.7448	275	.73217	042	.30406	817	.23754
53	544	.7045	305	.70441	072	.28376	846	.22204
54	573	.6645	334	.67680	101	.26355	876	.20661
55	.08602	11.6248	.10363	9.64935	.12131	8.24345	.13906	7.19125
56	632	.5853	393	.62205	160	.22344	935	.17594
57	661	.5461	422	.59490	190	.20352	965	.16071
58	690	.5072	452	.56791	219	.18370	995	.14553
59	720	.4685	481	.54106	249	.16398	.14024	.13042
60	.08749	11.4301	.10510	9.51436	.12278	8.14435	.14054	7.11537
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.
	85°		84°		83°		82°	

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

8°		9°		10°		11°		
Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
.14054	7.11537	.15838	6.31375	.17633	5.67128	.19438	5.14455	60
084	.10038	868	.30189	663	.66165	468	.13658	59
113	.08546	898	.29007	693	.65205	498	.12862	58
143	.07059	928	.27829	723	.64248	529	.12069	57
173	.05579	958	.26655	753	.63295	559	.11279	56
.14202	7.04105	.15988	6.25486	.17783	5.62344	.19589	5.10490	55
232	.02637	.16017	.24321	813	.61397	619	.09704	54
262	.01174	047	.23160	843	.60452	649	.08921	53
291	6.99718	077	.22003	873	.59511	680	.08139	52
321	.98268	107	.20851	903	.58573	710	.07360	51
.14351	6.96823	.16137	6.19703	.17933	5.57638	.19740	5.06584	50
381	.95385	167	.18559	963	.56706	770	.05809	49
410	.93952	196	.17419	993	.55777	801	.05037	48
440	.92525	226	.16283	.18023	.54851	831	.04267	47
470	.91104	256	.15151	053	.53927	861	.03499	46
.14499	6.89688	.16286	6.14023	.18083	5.53007	.19891	5.02734	45
529	.88278	316	.12899	113	.52090	921	.01971	44
559	.86874	346	.11779	143	.51176	952	.01210	43
588	.85475	376	.10664	173	.50264	982	.00451	42
618	.84082	405	.09552	203	.49356	.20012	4.99695	41
.14648	6.82694	.16435	6.08444	.18233	5.48451	.20042	4.98940	40
678	.81312	465	.07340	263	.47548	073	.98188	39
707	.79936	495	.06240	293	.46648	103	.97438	38
737	.78564	525	.05143	323	.45751	133	.96690	37
767	.77199	555	.04051	353	.44857	164	.95945	36
.14796	6.75838	.16585	6.02962	.18384	5.43966	.20194	4.95201	35
826	.74483	615	.01878	414	.43077	224	.94460	34
856	.73133	645	.00797	444	.42192	254	.93721	33
886	.71789	674	5.99720	474	.41309	285	.92984	32
915	.70450	704	.98646	504	.40429	315	.92249	31
.14945	6.69116	.16734	5.97576	.18534	5.39552	.20345	4.91516	30
975	.67787	764	.96510	564	.38677	376	.90785	29
.15005	.66463	794	.95448	594	.37805	406	.90056	28
034	.65144	824	.94390	624	.36936	436	.89330	27
064	.63831	854	.93335	654	.36070	466	.88605	26
.15094	6.62523	.16884	5.92283	.18684	5.35206	.20497	4.87882	25
124	.61219	914	.91236	714	.34345	527	.87162	24
153	.59921	944	.90191	745	.33487	557	.86444	23
183	.58627	974	.89151	775	.32631	588	.85727	22
213	.57339	.17004	.88114	805	.31778	618	.85013	21
.15243	6.56055	.17033	5.87080	.18835	5.30928	.20648	4.84300	20
272	.54777	063	.86051	865	.30080	679	.83590	19
302	.53503	093	.85024	895	.29235	709	.82882	18
332	.52234	123	.84001	925	.28393	739	.82175	17
362	.50970	153	.82982	955	.27553	770	.81471	16
.15391	6.49710	.17183	5.81966	.18986	5.26715	.20800	4.80769	15
421	.48456	213	.80953	.19016	.25880	830	.80068	14
451	.47206	243	.79944	046	.25048	861	.79370	13
481	.45961	273	.78938	076	.24218	891	.78673	12
511	.44720	303	.77936	106	.23391	921	.77978	11
.15540	6.43484	.17333	5.76937	.19136	5.22566	.20952	4.77286	10
570	.42253	363	.75941	166	.21744	982	.76595	9
600	.41026	393	.74949	197	.20925	.21013	.75906	8
630	.39804	423	.73960	227	.20107	043	.75219	7
660	.38587	453	.72974	257	.19293	073	.74534	6
.15689	6.37374	.17483	5.71992	.19287	5.18480	.21104	4.73851	5
719	.36165	513	.71013	317	.17671	134	.73170	4
749	.34961	543	.70037	347	.16863	164	.72490	3
779	.33761	573	.69064	378	.16058	195	.71813	2
809	.32566	603	.68094	408	.15256	225	.71137	1
.15838	6.31375	.17633	5.67128	.19438	5.14455	.21256	4.70463	0
Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	M.
81°		80°		79°		78°		

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	12°		13°		14°		15°	
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.
0	.21256	4.70463	.23087	4.33148	.24933	4.01078	.26795	3.73205
1	286	.69791	117	.32573	964	.00582	826	.72771
2	316	.69121	148	.32001	995	.00086	857	.72338
3	347	.68452	179	.31430	.25026	3.99592	888	.71907
4	377	.67786	209	.30860	056	.99099	920	.71476
5	.21408	4.67121	.23240	4.30291	.25087	3.98607	.26951	3.71046
6	438	.66458	271	.29724	118	.98117	982	.70616
7	469	.65797	301	.29159	149	.97627	.27013	.70188
8	499	.65138	332	.28595	180	.97139	044	.69761
9	529	.64480	363	.28032	211	.96651	076	.69335
10	.21560	4.63825	.23393	4.27471	.25242	3.96165	.27107	3.68909
11	590	.63171	424	.26911	273	.95680	138	.68485
12	621	.62518	455	.26352	304	.95196	169	.68061
13	651	.61868	485	.25795	335	.94713	201	.67638
14	682	.61219	516	.25239	366	.94232	232	.67217
15	.21712	4.60572	.23547	4.24685	.25397	3.93751	.27263	3.66796
16	743	.59927	578	.24132	428	.93271	294	.66376
17	773	.59283	608	.23580	459	.92793	326	.65957
18	804	.58641	639	.23030	490	.92316	357	.65538
19	834	.58001	670	.22481	521	.91839	388	.65121
20	.21864	4.57363	.23700	4.21933	.25552	3.91364	.27419	3.64705
21	895	.56726	731	.21387	583	.90890	451	.64289
22	925	.56091	762	.20842	614	.90417	482	.63874
23	956	.55458	793	.20298	645	.89945	513	.63461
24	986	.54826	823	.19756	676	.89474	545	.63048
25	.22017	4.54196	.23854	4.19215	.25707	3.89004	.27576	3.62636
26	047	.53568	885	.18675	738	.88536	607	.62224
27	078	.52941	916	.18137	769	.88068	638	.61814
28	108	.52316	946	.17600	800	.87601	670	.61405
29	139	.51693	977	.17064	831	.87136	701	.60996
30	.22169	4.51071	.24008	4.16530	.25862	3.86671	.27732	3.60588
31	200	.50451	039	.15997	893	.86208	764	.60181
32	231	.49832	069	.15465	924	.85745	795	.59775
33	261	.49215	100	.14934	955	.85284	826	.59370
34	292	.48600	131	.14405	986	.84824	858	.58966
35	.22322	4.47986	.24162	4.13877	.26017	3.84364	.27889	3.58562
36	353	.47374	193	.13350	048	.83906	921	.58160
37	383	.46764	223	.12825	079	.83449	952	.57758
38	414	.46155	254	.12301	110	.82992	983	.57357
39	444	.45548	285	.11778	141	.82537	.28015	.56957
40	.22475	4.44942	.24316	4.11256	.26172	3.82083	.28046	3.56557
41	505	.44338	347	.10736	203	.81630	077	.56159
42	536	.43735	377	.10216	235	.81177	109	.55761
43	567	.43134	408	.09699	266	.80726	140	.55364
44	597	.42534	439	.09182	297	.80276	172	.54968
45	.22628	4.41936	.24470	4.08666	.26328	3.79827	.28203	3.54573
46	658	.41340	501	.08152	359	.79378	234	.54179
47	689	.40745	532	.07639	390	.78931	266	.53785
48	719	.40152	562	.07127	421	.78485	297	.53393
49	750	.39560	593	.06616	452	.78040	329	.53001
50	.22781	4.38969	.24624	4.06107	.26483	3.77595	.28360	3.52609
51	811	.38381	655	.05599	515	.77152	391	.52219
52	842	.37793	686	.05092	546	.76709	423	.51829
53	872	.37207	717	.04586	577	.76268	454	.51441
54	903	.36623	747	.04081	608	.75828	486	.51053
55	.22934	4.36040	.24778	4.03578	.26639	3.75388	.28517	3.50666
56	964	.35459	809	.03076	670	.74950	549	.50279
57	995	.34879	840	.02574	701	.74512	580	.49894
58	.23026	.34300	871	.02074	733	.74075	612	.49509
59	056	.33723	902	.01576	764	.73640	643	.49125
60	.23087	4.33148	.24933	4.01078	.26795	3.73205	.28675	3.48741
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.
	77°		76°		75°		74°	

M.	16°		17°		18°		19°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.28675	3.48741	.30573	3.27085	.32492	3.07768	.34433	2.90421	60
1	706	.48359	605	.26745	524	.07464	465	.90147	59
2	738	.47977	637	.26406	556	.07160	498	.89873	58
3	769	.47596	669	.26067	588	.06857	530	.89600	57
4	801	.47216	700	.25729	621	.06554	563	.89327	56
5	.28832	3.46837	.30732	3.25392	.32653	3.06252	.34596	2.89055	55
6	864	.46458	764	.25055	685	.05950	628	.88783	54
7	895	.46080	796	.24719	717	.05649	661	.88511	53
8	927	.45703	828	.24383	749	.05349	693	.88240	52
9	958	.45327	860	.24049	782	.05049	726	.87970	51
10	.28990	3.44951	.30891	3.23714	.32814	3.04749	.34758	2.87700	50
11	.29021	.44576	923	.23381	846	.04450	791	.87430	49
12	053	.44202	955	.23048	878	.04152	824	.87161	48
13	084	.43829	987	.22715	911	.03854	856	.86892	47
14	116	.43456	.31019	.22384	943	.03556	889	.86624	46
15	.29147	3.43084	.31051	3.22053	.32975	3.03260	.34922	2.86356	45
16	179	.42713	083	.21722	.33007	.02963	954	.86089	44
17	210	.42343	115	.21392	040	.02667	987	.85822	43
18	242	.41973	147	.21063	072	.02372	.35020	.85555	42
19	274	.41604	178	.20734	104	.02077	052	.85289	41
20	.29305	3.41236	.31210	3.20406	.33136	3.01783	.35085	2.85023	40
21	337	.40869	242	.20079	169	.01489	118	.84758	39
22	368	.40502	274	.19752	201	.01196	150	.84494	38
23	400	.40136	306	.19426	233	.00903	183	.84229	37
24	432	.39771	338	.19100	266	.00611	216	.83965	36
25	.29463	3.39406	.31370	3.18775	.33298	3.00319	.35248	2.83702	35
26	495	.39042	402	.18451	330	.00028	281	.83439	34
27	526	.38679	434	.18127	363	2.99738	314	.83176	33
28	558	.38317	466	.17804	395	.99447	346	.82914	32
29	590	.37955	498	.17481	427	.99158	379	.82653	31
30	.29621	3.37594	.31530	3.17159	.33460	2.98868	.35412	2.82391	30
31	653	.37234	562	.16838	492	.98580	445	.82130	29
32	685	.36875	594	.16517	524	.98292	477	.81870	28
33	716	.36516	626	.16197	557	.98004	510	.81610	27
34	748	.36158	658	.15877	589	.97717	543	.81350	26
35	.29780	3.35800	.31690	3.15558	.33621	2.97430	.35576	2.81091	25
36	811	.35443	722	.15240	654	.97144	608	.80833	24
37	843	.35087	754	.14922	686	.96858	641	.80574	23
38	875	.34732	786	.14605	718	.96573	674	.80316	22
39	906	.34377	818	.14288	751	.96288	707	.80059	21
40	.29938	3.34023	.31850	3.13972	.33783	2.96004	.35740	2.79802	20
41	970	.33670	882	.13656	816	.95721	772	.79545	19
42	.30001	.33317	914	.13341	848	.95437	805	.79289	18
43	033	.32965	946	.13027	881	.95155	838	.79033	17
44	065	.32614	978	.12713	913	.94872	871	.78778	16
45	.30097	3.32264	.32010	3.12400	.33945	2.94591	.35904	2.78523	15
46	128	.31914	042	.12087	978	.94309	937	.78269	14
47	160	.31565	074	.11775	.34010	.94028	969	.78014	13
48	192	.31216	106	.11464	043	.93748	.36002	.77761	12
49	224	.30868	139	.11153	075	.93468	035	.77507	11
50	.30255	3.30521	.32171	3.10842	.34108	2.93189	.36068	2.77254	10
51	287	.30174	203	.10532	140	.92910	101	.77002	9
52	319	.29829	235	.10223	173	.92632	134	.76750	8
53	351	.29483	267	.09914	205	.92354	167	.76498	7
54	382	.29139	299	.09606	238	.92076	199	.76247	6
55	.30414	3.28795	.32331	3.09298	.34270	2.91799	.36232	2.75996	5
56	446	.28452	363	.08991	303	.91523	265	.75746	4
57	478	.28109	396	.08685	335	.91246	298	.75496	3
58	509	.27767	428	.08379	368	.90971	331	.75246	2
59	541	.27426	460	.08073	400	.90696	364	.74997	1
60	.30573	3.27085	.32492	3.07768	.34433	2.90421	.36397	2.74748	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	M.
	73°		72°		71°		70°		

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	20°		21°		22°		23°	
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.
0	.36397	2.74748	.38386	2.60509	.40403	2.47509	.42447	2.35585
1	430	.74499	420	.60283	436	.47302	482	.35395
2	463	.74251	453	.60057	470	.47095	516	.35205
3	496	.74004	487	.59831	504	.46888	551	.35015
4	529	.73756	520	.59606	538	.46682	585	.34825
5	.36562	2.73509	.38553	2.59381	.40572	2.46476	.42619	2.34636
6	595	.73263	587	.59156	606	.46270	654	.34447
7	628	.73017	620	.58932	640	.46065	688	.34258
8	661	.72771	654	.58708	674	.45860	722	.34069
9	694	.72526	687	.58484	707	.45655	757	.33881
10	.36727	2.72281	.38721	2.58261	.40741	2.45451	.42791	2.33693
11	760	.72036	754	.58038	775	.45246	826	.33505
12	793	.71792	787	.57815	809	.45043	860	.33317
13	826	.71548	821	.57593	843	.44839	894	.33130
14	859	.71305	854	.57371	877	.44636	929	.32943
15	.36892	2.71062	.38888	2.57150	.40911	2.44433	.42963	2.32756
16	925	.70819	921	.56928	945	.44230	998	.32570
17	958	.70577	955	.56707	979	.44027	.43032	.32383
18	991	.70335	988	.56487	.41013	.43825	067	.32197
19	.37024	.70094	.39022	.56266	047	.43623	101	.32012
20	.37057	2.69853	.39055	2.56046	.41081	2.43422	.43136	2.31826
21	090	.69612	089	.55827	115	.43220	170	.31641
22	123	.69371	122	.55608	149	.43019	205	.31456
23	157	.69131	156	.55389	183	.42819	239	.31271
24	190	.68892	190	.55170	217	.42618	274	.31086
25	.37223	2.68653	.39223	2.54952	.41251	2.42418	.43308	2.30902
26	256	.68414	257	.54734	285	.42218	343	.30718
27	289	.68175	290	.54516	319	.42019	378	.30534
28	322	.67937	324	.54299	353	.41819	412	.30351
29	355	.67700	357	.54082	387	.41620	447	.30167
30	.37388	2.67462	.39391	2.53865	.41421	2.41421	.43481	2.29984
31	422	.67225	425	.53648	455	.41223	516	.29801
32	455	.66989	458	.53432	490	.41025	550	.29619
33	488	.66752	492	.53217	524	.40827	585	.29437
34	521	.66516	526	.53001	558	.40629	620	.29254
35	.37554	2.66281	.39559	2.52786	.41592	2.40432	.43654	2.29073
36	588	.66046	593	.52571	626	.40235	689	.28891
37	621	.65811	626	.52357	660	.40038	724	.28710
38	654	.65576	660	.52142	694	.39841	758	.28528
39	687	.65342	694	.51929	728	.39645	793	.28348
40	.37720	2.65109	.39727	2.51715	.41763	2.39449	.43828	2.28167
41	754	.64875	761	.51502	797	.39253	862	.27987
42	787	.64642	795	.51289	831	.39058	897	.27806
43	820	.64410	829	.51076	865	.38863	932	.27626
44	853	.64177	862	.50864	899	.38668	966	.27447
45	.37887	2.63945	.39896	2.50652	.41933	2.38473	.44001	2.27267
46	920	.63714	930	.50440	968	.38279	036	.27088
47	953	.63483	963	.50229	.42002	.38084	071	.26909
48	986	.63252	997	.50018	036	.37891	105	.26730
49	.38020	.63021	.40031	.49807	070	.37697	140	.26552
50	.38053	2.62791	.40065	2.49597	.42105	2.37504	.44175	2.26374
51	086	.62561	098	.49386	139	.37311	210	.26196
52	120	.62332	132	.49177	173	.37118	244	.26018
53	153	.62103	166	.48967	207	.36925	279	.25840
54	186	.61874	200	.48758	242	.36733	314	.25663
55	.38220	2.61646	.40234	2.48549	.42276	2.36541	.44349	2.25486
56	253	.61418	267	.48340	310	.36349	384	.25309
57	286	.61190	301	.48132	345	.36158	418	.25132
58	320	.60963	335	.47924	379	.35967	453	.24956
59	353	.60736	369	.47716	413	.35776	488	.24780
60	.38386	2.60509	.40403	2.47509	.42447	2.35585	.44523	2.24604
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.
	69°		68°		67°		66°	

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	24°		25°		26°		27°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.44523	2.24604	.46631	2.14451	.48773	2.05030	.50953	1.96261	60
1	558	.24428	666	.14288	809	.04879	989	.96120	59
2	593	.24252	702	.14125	845	.04728	.51026	.95979	58
3	627	.24077	737	.13963	881	.04577	063	.95838	57
4	662	.23902	772	.13801	917	.04426	099	.95698	56
5	.44697	2.23727	.46808	2.13639	.48953	2.04276	.51136	1.95557	55
6	732	.23553	843	.13477	989	.04125	173	.95417	54
7	767	.23378	879	.13316	.49026	.03975	209	.95277	53
8	802	.23204	914	.13154	062	.03825	246	.95137	52
9	837	.23030	950	.12993	098	.03675	283	.94997	51
10	.44872	2.22857	.46985	2.12832	.49134	2.03526	.51319	1.94858	50
11	907	.22683	.47021	.12671	170	.03376	356	.94718	49
12	942	.22510	056	.12511	206	.03227	393	.94579	48
13	977	.22337	092	.12350	242	.03078	430	.94440	47
14	.45012	.22164	128	.12190	278	.02929	467	.94301	46
15	.45047	2.21992	.47163	2.12030	.49315	2.02780	.51503	1.94162	45
16	082	.21819	199	.11871	351	.02631	540	.94023	44
17	117	.21647	234	.11711	387	.02483	577	.93885	43
18	152	.21475	270	.11552	423	.02335	614	.93746	42
19	187	.21304	305	.11392	459	.02187	651	.93608	41
20	.45222	2.21132	.47341	2.11233	.49495	2.02039	.51688	1.93470	40
21	257	.20961	377	.11075	532	.01891	724	.93332	39
22	292	.20790	412	.10916	568	.01743	761	.93195	38
23	327	.20619	448	.10758	604	.01596	798	.93057	37
24	362	.20449	483	.10600	640	.01449	835	.92920	36
25	.45397	2.20278	.47519	2.10442	.49677	2.01302	.51872	1.92782	35
26	432	.20108	555	.10284	713	.01155	909	.92645	34
27	467	.19938	590	.10126	749	.01008	946	.92508	33
28	502	.19769	626	.09969	786	.00862	983	.92371	32
29	538	.19599	662	.09811	822	.00715	.52020	.92235	31
30	.45573	2.19430	.47698	2.09654	.49858	2.00569	.52057	1.92098	30
31	608	.19261	733	.09498	894	.00423	094	.91962	29
32	643	.19092	769	.09341	931	.00277	131	.91826	28
33	678	.18923	805	.09184	967	.00131	168	.91690	27
34	713	.18755	840	.09028	.50004	1.99986	205	.91554	26
35	.45748	2.18587	.47876	2.08872	.50040	1.99841	.52242	1.91418	25
36	784	.18419	912	.08716	076	.99695	279	.91282	24
37	819	.18251	948	.08560	113	.99550	316	.91147	23
38	854	.18084	984	.08405	149	.99406	353	.91012	22
39	889	.17916	.48019	.08250	185	.99261	390	.90876	21
40	.45924	2.17749	.48055	2.08094	.50222	1.99116	.52427	1.90741	20
41	960	.17582	091	.07939	258	.98972	464	.90607	19
42	995	.17416	127	.07785	295	.98828	501	.90472	18
43	.46030	.17249	163	.07630	331	.98684	538	.90337	17
44	065	.17083	198	.07476	368	.98540	575	.90203	16
45	.46101	2.16917	.48234	2.07321	.50404	1.98396	.52613	1.90069	15
46	136	.16751	270	.07167	441	.98253	650	.89935	14
47	171	.16585	306	.07014	477	.98110	687	.89801	13
48	206	.16420	342	.06860	514	.97966	724	.89667	12
49	242	.16255	378	.06706	550	.97823	761	.89533	11
50	.46277	2.16090	.48414	2.06553	.50587	1.97681	.52798	1.89400	10
51	312	.15925	450	.06400	623	.97538	836	.89266	9
52	348	.15760	486	.06247	660	.97395	873	.89133	8
53	383	.15596	521	.06094	696	.97253	910	.89000	7
54	418	.15432	557	.05942	733	.97111	947	.88867	6
55	.46454	2.15268	.48593	2.05790	.50769	1.96969	.52985	1.88734	5
56	489	.15104	629	.05637	806	.96827	.53022	.88602	4
57	525	.14940	665	.05485	843	.96685	059	.88469	3
58	560	.14777	701	.05333	879	.96544	096	.88337	2
59	595	.14614	737	.05182	916	.96402	134	.88205	1
60	.46631	2.14451	.48773	2.05030	.50953	1.96261	.53171	1.88073	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	
	65°		64°		63°		62°		M.

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	28°		29°		30°		31°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.53171	1.88073	.55431	1.80405	.57735	1.73205	.60086	1.66428	60
1	208	.87941	469	.80281	774	.73089	126	.66318	59
2	246	.87809	507	.80158	813	.72973	165	.66209	58
3	283	.87677	545	.80034	851	.72857	205	.66099	57
4	320	.87546	583	.79911	890	.72741	245	.65990	56
5	.53358	1.87415	.55621	1.79788	.57929	1.72625	.60284	1.65881	55
6	395	.87283	659	.79665	968	.72509	324	.65772	54
7	432	.87152	697	.79542	.58007	.72393	364	.65663	53
8	470	.87021	736	.79419	046	.72278	403	.65554	52
9	507	.86891	774	.79296	085	.72163	443	.65445	51
10	.53545	1.86760	.55812	1.79174	.58124	1.72047	.60483	1.65337	50
11	582	.86630	850	.79051	162	.71932	522	.65228	49
12	620	.86499	888	.78929	201	.71817	562	.65120	48
13	657	.86369	926	.78807	240	.71702	602	.65011	47
14	694	.86239	964	.78685	279	.71588	642	.64903	46
15	.53732	1.86109	.56003	1.78563	.58318	1.71473	.60681	1.64795	45
16	769	.85979	041	.78441	357	.71358	721	.64687	44
17	807	.85850	079	.78319	396	.71244	761	.64579	43
18	844	.85720	117	.78198	435	.71129	801	.64471	42
19	882	.85591	156	.78077	474	.71015	841	.64363	41
20	.53920	1.85462	.56194	1.77955	.58513	1.70901	.60881	1.64256	40
21	957	.85333	232	.77834	552	.70787	921	.64148	39
22	995	.85204	270	.77713	591	.70673	960	.64041	38
23	.54032	.85075	309	.77592	631	.70560	.61000	.63934	37
24	070	.84946	347	.77471	670	.70446	040	.63826	36
25	.54107	1.84818	.56385	1.77351	.58709	1.70332	.61080	1.63719	35
26	145	.84689	424	.77230	748	.70219	120	.63612	34
27	183	.84561	462	.77110	787	.70106	160	.63505	33
28	220	.84433	501	.76990	826	.69992	200	.63398	32
29	258	.84305	539	.76869	865	.69879	240	.63292	31
30	.54296	1.84177	.56577	1.76749	.58905	1.69766	.61280	1.63185	30
31	333	.84049	616	.76629	944	.69653	320	.63079	29
32	371	.83922	654	.76510	983	.69541	360	.62972	28
33	409	.83794	693	.76390	.59022	.69428	400	.62866	27
34	446	.83667	731	.76271	061	.69316	440	.62760	26
35	.54484	1.83540	.56769	1.76151	.59101	1.69203	.61480	1.62654	25
36	522	.83413	808	.76032	140	.69091	520	.62548	24
37	560	.83286	846	.75913	179	.68979	561	.62442	23
38	597	.83159	885	.75794	218	.68866	601	.62336	22
39	635	.83033	923	.75675	258	.68754	641	.62230	21
40	.54673	1.82906	.56962	1.75556	.59297	1.68643	.61681	1.62125	20
41	711	.82780	.57000	.75437	336	.68531	721	.62019	19
42	748	.82654	039	.75319	376	.68419	761	.61914	18
43	786	.82528	078	.75200	415	.68308	801	.61808	17
44	824	.82402	116	.75082	454	.68196	842	.61703	16
45	.54862	1.82276	.57155	1.74964	.59494	1.68085	.61882	1.61598	15
46	900	.82150	193	.74846	533	.67974	922	.61493	14
47	938	.82025	232	.74728	573	.67863	962	.61388	13
48	975	.81899	271	.74610	612	.67752	.62003	.61283	12
49	.55013	.81774	309	.74492	651	.67641	043	.61179	11
50	.55051	1.81649	.57348	1.74375	.59691	1.67530	.62083	1.61074	10
51	089	.81524	386	.74257	730	.67419	124	.60970	9
52	127	.81399	425	.74140	770	.67309	164	.60865	8
53	165	.81274	464	.74022	809	.67198	204	.60761	7
54	203	.81150	503	.73905	849	.67088	245	.60657	6
55	.55241	1.81025	.57541	1.73788	.59888	1.66978	.62285	1.60553	5
56	279	.80901	580	.73671	928	.66867	325	.60449	4
57	317	.80777	619	.73555	967	.66757	366	.60345	3
58	355	.80653	657	.73438	.60007	.66647	406	.60241	2
59	393	.80529	696	.73321	046	.66538	446	.60137	1
60	.55431	1.80405	.57735	1.73205	.60086	1.66428	.62487	1.60033	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	M.
	61°		60°		59°		58°		

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	32°		33°		34°		35°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.62487	1.60033	.64941	1.53986	.67451	1.48256	.70021	1.42815	60
1	527	.59930	982	.53888	493	.48163	064	.42726	59
2	568	.59826	.65024	.53791	536	.48070	107	.42638	58
3	608	.59723	065	.53693	578	.47977	151	.42550	57
4	649	.59620	106	.53595	620	.47885	194	.42462	56
5	.62689	1.59517	.65148	1.53497	.67663	1.47792	.70238	1.42374	55
6	730	.59414	189	.53400	705	.47699	281	.42286	54
7	770	.59311	231	.53302	748	.47607	325	.42198	53
8	811	.59208	272	.53205	790	.47514	368	.42110	52
9	852	.59105	314	.53107	832	.47422	412	.42022	51
10	.62892	1.59002	.65355	1.53010	.67875	1.47330	.70455	1.41934	50
11	933	.58900	397	.52913	917	.47238	499	.41847	49
12	973	.58797	438	.52816	960	.47146	542	.41759	48
13	.63014	.58695	480	.52719	.68002	.47053	586	.41672	47
14	055	.58593	521	.52622	045	.46962	629	.41584	46
15	.63095	1.58490	.65563	1.52525	.68088	1.46870	.70673	1.41497	45
16	136	.58388	604	.52429	130	.46778	717	.41409	44
17	177	.58286	646	.52332	173	.46686	760	.41322	43
18	217	.58184	688	.52235	215	.46595	804	.41235	42
19	258	.58083	729	.52139	258	.46503	848	.41148	41
20	.63299	1.57981	.65771	1.52043	.68301	1.46411	.70891	1.41061	40
21	340	.57879	813	.51946	343	.46320	935	.40974	39
22	380	.57778	854	.51850	386	.46229	979	.40887	38
23	421	.57676	896	.51754	429	.46137	.71023	.40800	37
24	462	.57575	938	.51658	471	.46046	066	.40714	36
25	.63503	1.57474	.65980	1.51562	.68514	1.45955	.71110	1.40627	35
26	544	.57372	.66021	.51466	557	.45864	154	.40540	34
27	584	.57271	063	.51370	600	.45773	198	.40454	33
28	625	.57170	105	.51275	642	.45682	242	.40367	32
29	666	.57069	147	.51179	685	.45592	285	.40281	31
30	.63707	1.56969	.66189	1.51084	.68728	1.45501	.71329	1.40195	30
31	748	.56868	230	.50988	771	.45410	373	.40109	29
32	789	.56767	272	.50893	814	.45320	417	.40022	28
33	830	.56667	314	.50797	857	.45229	461	.39936	27
34	871	.56566	356	.50702	900	.45139	505	.39850	26
35	.63912	1.56466	.66398	1.50607	.68942	1.45049	.71549	1.39764	25
36	953	.56366	440	.50512	985	.44958	593	.39679	24
37	994	.56265	482	.50417	.69028	.44868	637	.39593	23
38	.64035	.56165	524	.50322	071	.44778	681	.39507	22
39	076	.56065	566	.50228	114	.44688	725	.39421	21
40	.64117	1.55966	.66608	1.50133	.69157	1.44598	.71769	1.39336	20
41	158	.55866	650	.50038	200	.44508	813	.39250	19
42	199	.55766	692	.49944	243	.44418	857	.39165	18
43	240	.55666	734	.49849	286	.44329	901	.39079	17
44	281	.55567	776	.49755	329	.44239	946	.38994	16
45	.64322	1.55467	.66818	1.49661	.69372	1.44149	.71990	1.38909	15
46	363	.55368	860	.49566	416	.44060	.72034	.38824	14
47	404	.55269	902	.49472	459	.43970	078	.38738	13
48	446	.55170	944	.49378	502	.43881	122	.38653	12
49	487	.55071	986	.49284	545	.43792	167	.38568	11
50	.64528	1.54972	.67028	1.49190	.69588	1.43703	.72211	1.38484	10
51	569	.54873	071	.49097	631	.43614	255	.38399	9
52	610	.54774	113	.49003	675	.43525	299	.38314	8
53	652	.54675	155	.48909	718	.43436	344	.38229	7
54	693	.54576	197	.48816	761	.43347	388	.38145	6
55	.64734	1.54478	.67239	1.48722	.69804	1.43258	.72432	1.38060	5
56	775	.54379	282	.48629	847	.43169	477	.37976	4
57	817	.54281	324	.48536	891	.43080	521	.37891	3
58	858	.54183	366	.48442	934	.42992	565	.37807	2
59	899	.54085	409	.48349	977	.42903	610	.37722	1
60	.64941	1.53986	.67451	1.48256	.70021	1.42815	.72654	1.37638	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	M.
	57°		56°		55°		54°		

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	36°		37°		38°		39°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.72654	1.37638	.75355	1.32704	.78129	1.27994	.80978	1.23490	60
1	699	.37554	401	.32624	175	.27917	.81027	.23416	59
2	743	.37470	447	.32544	222	.27841	075	.23343	58
3	788	.37386	492	.32464	269	.27764	123	.23270	57
4	832	.37302	538	.32384	316	.27688	171	.23196	56
5	.72877	1.37218	.75584	1.32304	.78363	1.27611	.81220	1.23123	55
6	921	.37134	629	.32224	410	.27535	268	.23050	54
7	966	.37050	675	.32144	457	.27458	316	.22977	53
8	.73010	.36967	721	.32064	504	.27382	364	.22904	52
9	055	.36883	767	.31984	551	.27306	413	.22831	51
10	.73100	1.36800	.75812	1.31904	.78598	1.27230	.81461	1.22758	50
11	144	.36716	858	.31825	645	.27153	510	.22685	49
12	189	.36633	904	.31745	692	.27077	558	.22612	48
13	234	.36549	950	.31666	739	.27001	606	.22539	47
14	278	.36466	996	.31586	786	.26925	655	.22467	46
15	.73323	1.36383	.76042	1.31507	.78834	1.26849	.81703	1.22394	45
16	368	.36300	088	.31427	881	.26774	752	.22321	44
17	413	.36217	134	.31348	928	.26698	800	.22249	43
18	457	.36134	180	.31269	975	.26622	849	.22176	42
19	502	.36051	226	.31190	.79022	.26546	898	.22104	41
20	.73547	1.35968	.76272	1.31110	.79070	1.26471	.81946	1.22031	40
21	592	.35885	318	.31031	117	.26395	995	.21959	39
22	637	.35802	364	.30952	164	.26319	.82044	.21886	38
23	681	.35719	410	.30873	212	.26244	092	.21814	37
24	726	.35637	456	.30795	259	.26169	141	.21742	36
25	.73771	1.35554	.76502	1.30716	.79306	1.26093	.82190	1.21670	35
26	816	.35472	548	.30637	354	.26018	238	.21598	34
27	861	.35389	594	.30558	401	.25943	287	.21526	33
28	906	.35307	640	.30480	449	.25867	336	.21454	32
29	951	.35224	686	.30401	496	.25792	385	.21382	31
30	.73996	1.35142	.76733	1.30323	.79544	1.25717	.82434	1.21310	30
31	.74041	.35060	779	.30244	591	.25642	483	.21238	29
32	086	.34978	825	.30166	639	.25567	531	.21166	28
33	131	.34896	871	.30087	686	.25492	580	.21094	27
34	176	.34814	918	.30009	734	.25417	629	.21023	26
35	.74221	1.34732	.76964	1.29931	.79781	1.25343	.82678	1.20951	25
36	267	.34650	.77010	.29853	829	.25268	727	.20879	24
37	312	.34568	057	.29775	877	.25193	776	.20808	23
38	357	.34487	103	.29696	924	.25118	825	.20736	22
39	402	.34405	149	.29618	972	.25044	874	.20665	21
40	.74447	1.34323	.77196	1.29541	.80020	1.24969	.82923	1.20593	20
41	492	.34242	242	.29463	067	.24895	972	.20522	19
42	538	.34160	289	.29385	115	.24820	.83022	.20451	18
43	583	.34079	335	.29307	163	.24746	071	.20379	17
44	628	.33998	382	.29229	211	.24672	120	.20308	16
45	.74674	1.33916	.77428	1.29152	.80258	1.24597	.83169	1.20237	15
46	719	.33835	475	.29074	306	.24523	218	.20166	14
47	764	.33754	521	.28997	354	.24449	268	.20095	13
48	810	.33673	568	.28919	402	.24375	317	.20024	12
49	855	.33592	615	.28842	450	.24301	366	.19953	11
50	.74900	1.33511	.77661	1.28764	.80498	1.24227	.83415	1.19882	10
51	946	.33430	708	.28687	546	.24153	465	.19811	9
52	991	.33349	754	.28610	594	.24079	514	.19740	8
53	.75037	.33268	801	.28533	642	.24005	564	.19669	7
54	082	.33187	848	.28456	690	.23931	613	.19599	6
55	.75128	1.33107	.77895	1.28379	.80738	1.23858	.83662	1.19528	5
56	173	.33026	941	.28302	786	.23784	712	.19457	4
57	219	.32946	988	.28225	834	.23710	761	.19387	3
58	264	.32865	.78035	.28148	882	.23637	811	.19316	2
59	310	.32785	082	.28071	930	.23563	860	.19246	1
60	.75355	1.32704	.78129	1.27994	.80978	1.23490	.83910	1.19175	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	M.
	53°		52°		51°		50°		

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	40°		41°		42°		43°		
	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	
0	.83910	1.19175	.86929	1.15037	.90040	1.11061	.93252	1.07237	60
1	960	.19105	980	.14969	093	.10996	306	.07174	59
2	.84009	.19035	.87031	.14902	146	.10931	360	.07112	58
3	059	.18964	082	.14834	199	.10867	415	.07049	57
4	108	.18894	133	.14767	251	.10802	469	.06987	56
5	.84158	1.18824	.87184	1.14699	.90304	1.10737	.93524	1.06925	55
6	208	.18754	236	.14632	357	.10672	578	.06862	54
7	258	.18684	287	.14565	410	.10607	633	.06800	53
8	307	.18614	338	.14498	463	.10543	688	.06738	52
9	357	.18544	389	.14430	516	.10478	742	.06676	51
10	.84407	1.18474	.87441	1.14363	.90569	1.10414	.93797	1.06613	50
11	457	.18404	492	.14296	621	.10349	852	.06551	49
12	507	.18334	543	.14229	674	.10285	906	.06489	48
13	556	.18264	595	.14162	727	.10220	961	.06427	47
14	606	.18194	646	.14095	781	.10156	.94016	.06365	46
15	.84656	1.18125	.87698	1.14028	.90834	1.10091	.94071	1.06303	45
16	706	.18055	749	.13961	887	.10027	125	.06241	44
17	756	.17986	801	.13894	940	.09963	180	.06179	43
18	806	.17916	852	.13828	993	.09899	235	.06117	42
19	856	.17846	904	.13761	.91046	.09834	290	.06056	41
20	.84906	1.17777	.87955	1.13694	.91099	1.09770	.94345	1.05994	40
21	956	.17708	.88007	.13627	153	.09706	400	.05932	39
22	.85006	.17638	059	.13561	206	.09642	455	.05870	38
23	057	.17569	110	.13494	259	.09578	510	.05809	37
24	107	.17500	162	.13428	313	.09514	565	.05747	36
25	.85157	1.17430	.88214	1.13361	.91366	1.09450	.94620	1.05685	35
26	207	.17361	265	.13295	419	.09386	676	.05624	34
27	257	.17292	317	.13228	473	.09322	731	.05562	33
28	308	.17223	369	.13162	526	.09258	786	.05501	32
29	358	.17154	421	.13096	580	.09195	841	.05439	31
30	.85408	1.17085	.88473	1.13029	.91633	1.09131	.94896	1.05378	30
31	458	.17016	524	.12963	687	.09067	952	.05317	29
32	509	.16947	576	.12897	740	.09003	.95007	.05255	28
33	559	.16878	628	.12831	794	.08940	062	.05194	27
34	609	.16809	680	.12765	847	.08876	118	.05133	26
35	.85660	1.16741	.88732	1.12699	.91901	1.08813	.95173	1.05072	25
36	710	.16672	784	.12633	955	.08749	229	.05010	24
37	761	.16603	836	.12567	.92008	.08686	284	.04949	23
38	811	.16535	888	.12501	062	.08622	340	.04888	22
39	862	.16466	940	.12435	116	.08559	395	.04827	21
40	.85912	1.16398	.88992	1.12369	.92170	1.08496	.95451	1.04766	20
41	963	.16329	.89045	.12303	224	.08432	506	.04705	19
42	.86014	.16261	097	.12238	277	.08369	562	.04644	18
43	064	.16192	149	.12172	331	.08306	618	.04583	17
44	115	.16124	201	.12106	385	.08243	673	.04522	16
45	.86166	1.16056	.89253	1.12041	.92439	1.08179	.95729	1.04461	15
46	216	.15987	306	.11975	493	.08116	785	.04401	14
47	267	.15919	358	.11909	547	.08053	841	.04340	13
48	318	.15851	410	.11844	601	.07990	897	.04279	12
49	368	.15783	463	.11778	655	.07927	952	.04218	11
50	.86419	1.15715	.89515	1.11713	.92709	1.07864	.96008	1.04158	10
51	470	.15647	567	.11648	763	.07801	064	.04097	9
52	521	.15579	620	.11582	817	.07738	120	.04036	8
53	572	.15511	672	.11517	872	.07676	176	.03976	7
54	623	.15443	725	.11452	926	.07613	232	.03915	6
55	.86674	1.15375	.89777	1.11387	.92980	1.07550	.96288	1.03855	5
56	725	.15308	830	.11321	.93034	.07487	344	.03794	4
57	776	.15240	883	.11256	088	.07425	400	.03734	3
58	827	.15172	935	.11191	143	.07362	457	.03674	2
59	878	.15104	988	.11126	197	.07299	513	.03613	1
60	.86929	1.15037	.90040	1.11061	.93252	1.07237	.96569	1.03553	0
	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	Cot.	Tan.	
	49°		48°		47°		46°		M

TABLE XVIII.—NATURAL TANGENTS AND COTANGENTS.

M.	44°			M.	44°			M.	44°		
	Tan.	Cot.			Tan.	Cot.			Tan.	Cot.	
0	.96569	1.03553	60	20	.97700	1.02355	40	40	.98843	1.01170	20
1	625	.03493	59	21	756	.02295	39	41	901	.01112	19
2	681	.03433	58	22	813	.02236	38	42	958	.01053	18
3	738	.03372	57	23	870	.02176	37	43	.99016	.00994	17
4	794	.03312	56	24	927	.02117	36	44	073	.00935	16
5	.96850	1.03252	55	25	.97984	1.02057	35	45	.99131	1.00876	15
6	907	.03192	54	26	.98041	.01998	34	46	189	.00818	14
7	963	.03132	53	27	098	.01939	33	47	247	.00759	13
8	.97020	.03072	52	28	155	.01879	32	48	304	.00701	12
9	076	.03012	51	29	213	.01820	31	49	362	.00642	11
10	.97133	1.02952	50	30	.98270	1.01761	30	50	.99420	1.00583	10
11	189	.02892	49	31	327	.01702	29	51	478	.00525	9
12	246	.02832	48	32	384	.01642	28	52	536	.00467	8
13	302	.02772	47	33	441	.01583	27	53	594	.00408	7
14	359	.02713	46	34	499	.01524	26	54	652	.00350	6
15	.97416	1.02653	45	35	.98556	1.01465	25	55	.99710	1.00291	5
16	472	.02593	44	36	613	.01406	24	56	768	.00233	4
17	529	.02533	43	37	671	.01347	23	57	826	.00175	3
18	586	.02474	42	38	728	.01288	22	58	884	.00116	2
19	643	.02414	41	39	786	.01229	21	59	942	.00058	1
20	.97700	1.02355	40	40	.98843	1.01170	20	60	1.00000	1.00000	0
	Cot.	Tan.			Cot.	Tan.			Cot.	Tan.	
	45°		M.		45°		M.		45°		M.

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

M.	0°		1°		2°		3°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.00000	.00000	.00015	.00015	.00061	.00061	.00137	.00137	0
1	000	000	016	016	062	062	139	139	1
2	000	000	016	016	063	063	140	140	2
3	000	000	017	017	064	064	142	142	3
4	000	000	017	017	065	065	143	143	4
5	.00000	.00000	.00018	.00018	.00066	.00066	.00145	.00145	5
6	000	000	018	018	067	067	146	147	6
7	000	000	019	019	068	068	148	148	7
8	000	000	020	020	069	069	149	150	8
9	000	000	020	020	070	070	151	151	9
10	.00000	.00000	.00021	.00021	.00071	.00072	.00153	.00153	10
11	001	001	021	021	073	073	154	155	11
12	001	001	022	022	074	074	156	156	12
13	001	001	023	023	075	075	158	158	13
14	001	001	023	023	076	076	159	159	14
15	.00001	.00001	.00024	.00024	.00077	.00077	.00161	.00161	15
16	001	001	024	024	078	078	162	163	16
17	001	001	025	025	079	079	164	164	17
18	001	001	026	026	081	081	166	166	18
19	002	002	026	026	082	082	167	168	19
20	.00002	.00002	.00027	.00027	.00083	.00083	.00169	.00169	20
21	002	002	028	028	084	084	171	171	21
22	002	002	028	028	085	085	173	173	22
23	002	002	029	029	087	087	174	175	23
24	002	002	030	030	088	088	176	176	24
25	.00003	.00003	.00031	.00031	.00089	.00089	.00178	.00178	25
26	003	003	031	031	090	090	179	180	26
27	003	003	032	032	091	091	181	182	27
28	003	003	033	033	093	093	183	183	28
29	004	004	034	034	094	094	185	185	29
30	.00004	.00004	.00034	.00034	.00095	.00095	.00187	.00187	30
31	004	004	035	035	096	097	188	189	31
32	004	004	036	036	098	098	190	190	32
33	005	005	037	037	099	099	192	192	33
34	005	005	037	037	100	100	194	194	34
35	.00005	.00005	.00038	.00038	.00102	.00102	.00196	.00196	35
36	005	005	039	039	103	103	197	198	36
37	006	006	040	040	104	104	199	200	37
38	006	006	041	041	106	106	201	201	38
39	006	006	041	041	107	107	203	203	39
40	.00007	.00007	.00042	.00042	.00108	.00108	.00205	.00205	40
41	007	007	043	043	110	110	207	207	41
42	007	007	044	044	111	111	208	209	42
43	008	008	045	045	112	113	210	211	43
44	008	008	046	046	114	114	212	213	44
45	.00009	.00009	.00047	.00047	.00115	.00115	.00214	.00215	45
46	009	009	048	048	117	117	216	216	46
47	009	009	048	048	118	118	218	218	47
48	010	010	049	049	119	120	220	220	48
49	010	010	050	050	121	121	222	222	49
50	.00011	.00011	.00051	.00051	.00122	.00122	.00224	.00224	50
51	011	011	052	052	124	124	226	226	51
52	011	011	053	053	125	125	228	228	52
53	012	012	054	054	127	127	230	230	53
54	012	012	055	055	128	128	232	232	54
55	.00013	.00013	.00056	.00056	.00130	.00130	.00234	.00234	55
56	013	013	057	057	131	131	236	236	56
57	014	014	058	058	133	133	238	238	57
58	014	014	059	059	134	134	240	240	58
59	015	015	060	060	136	136	242	242	59
60	.00015	.00015	.00061	.00061	.00137	.00137	.00244	.00244	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECA

M.	4°		5°		6°		7°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.
0	.00244	.00244	.00381	.00382	.00548	.00551	.00745	.00751
1	246	246	383	385	551	554	749	755
2	248	248	386	387	554	557	752	758
3	250	250	388	390	557	560	756	762
4	252	252	391	392	560	563	760	765
5	.00254	.00254	.00393	.00395	.00563	.00566	.00763	.00769
6	256	257	396	397	566	569	767	773
7	258	259	398	400	569	573	770	776
8	260	261	401	403	572	576	774	780
9	262	263	404	405	576	579	778	784
10	.00264	.00265	.00406	.00408	.00579	.00582	.00781	.00787
11	266	267	409	411	582	585	785	791
12	269	269	412	413	585	588	789	795
13	271	271	414	416	588	592	792	799
14	273	274	417	419	591	595	796	802
15	.00275	.00276	.00420	.00421	.00594	.00598	.00800	.00806
16	277	278	422	424	598	601	803	810
17	279	280	425	427	601	604	807	813
18	281	282	428	429	604	608	811	817
19	284	284	430	432	607	611	814	821
20	.00286	.00287	.00433	.00435	.00610	.00614	.00818	.00825
21	288	289	436	438	614	617	822	828
22	290	291	438	440	617	621	825	832
23	292	293	441	443	620	624	829	836
24	295	296	444	446	623	627	833	840
25	.00297	.00298	.00447	.00449	.00626	.00630	.00837	.00844
26	299	300	449	451	630	634	840	848
27	301	302	452	454	633	637	844	851
28	304	305	455	457	636	640	848	855
29	306	307	458	460	640	644	852	859
30	.00308	.00309	.00460	.00463	.00643	.00647	.00856	.00863
31	311	312	463	465	646	650	859	867
32	313	314	466	468	649	654	863	871
33	315	316	469	471	653	657	867	875
34	317	318	472	474	656	660	871	878
35	.00320	.00321	.00474	.00477	.00659	.00664	.00875	.00882
36	322	323	477	480	663	667	878	886
37	324	326	480	482	666	671	882	890
38	327	328	483	485	669	674	886	894
39	329	330	486	488	673	677	890	898
40	.00332	.00333	.00489	.00491	.00676	.00681	.00894	.00902
41	334	335	492	494	680	684	898	906
42	336	337	494	497	683	688	902	910
43	339	340	497	500	686	691	906	914
44	341	342	500	503	690	695	909	918
45	.00343	.00345	.00503	.00506	.00693	.00698	.00913	.00922
46	346	347	506	509	697	701	917	926
47	348	349	509	512	700	705	921	930
48	351	352	512	515	703	708	925	934
49	353	354	515	518	707	712	929	938
50	.00356	.00357	.00518	.00521	.00710	.00715	.00933	.00942
51	358	359	521	524	714	719	937	946
52	361	362	524	527	717	722	941	950
53	363	364	527	530	721	726	945	954
54	365	367	530	533	724	730	949	958
55	.00368	.00369	.00533	.00536	.00728	.00733	.00953	.00962
56	370	372	536	539	731	737	957	966
57	373	374	539	542	735	740	961	970
58	375	377	542	545	738	744	965	975
59	378	379	545	548	742	747	969	979
60	.00381	.00382	.00548	.00551	.00745	.00751	.00973	.00983

8°		9°		10°		11°		M.
Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
.00973	.00983	.01231	.01247	.01519	.01543	.01837	.01872	0
977	987	236	251	524	548	843	877	1
981	991	240	256	529	553	848	883	2
985	995	245	261	534	558	854	889	3
989	999	249	265	539	564	860	895	4
.00994	.01004	.01254	.01270	.01545	.01569	.01865	.01901	5
998	008	259	275	550	574	871	906	6
.01002	012	263	279	555	579	876	912	7
006	016	268	284	560	585	882	918	8
010	020	272	289	565	590	888	924	9
.01014	.01024	.01277	.01294	.01570	.01595	.01893	.01930	10
018	029	282	298	575	601	899	936	11
022	033	286	303	580	606	904	941	12
027	037	291	308	586	611	910	947	13
031	041	296	313	591	616	916	953	14
.01035	.01046	.01300	.01317	.01596	.01622	.01921	.01959	15
039	050	305	322	601	627	927	965	16
043	054	310	327	606	633	933	971	17
047	059	314	332	611	638	939	977	18
052	063	319	337	617	643	944	983	19
.01056	.01067	.01324	.01342	.01622	.01649	.01950	.01989	20
060	071	329	346	627	654	956	995	21
064	076	333	351	632	659	961	.02001	22
069	080	338	356	638	665	967	007	23
073	084	343	361	643	670	973	013	24
.01077	.01089	.01348	.01366	.01648	.01676	.01979	.02019	25
081	093	352	371	653	681	984	025	26
086	097	357	376	659	687	990	031	27
090	102	362	381	664	692	996	037	28
094	106	367	386	669	698	.02002	043	29
.01098	.01111	.01371	.01391	.01675	.01703	.02008	.02049	30
103	115	376	395	680	709	013	055	31
107	119	381	400	685	714	019	061	32
111	124	386	405	690	720	025	067	33
116	128	391	410	696	725	031	073	34
.01120	.01133	.01396	.01415	.01701	.01731	.02037	.02079	35
124	137	400	420	706	736	042	085	36
129	142	405	425	712	742	048	091	37
133	146	410	430	717	747	054	097	38
137	151	415	435	723	753	060	103	39
.01142	.01155	.01420	.01440	.01728	.01758	.02066	.02110	40
146	160	425	445	733	764	072	116	41
151	164	430	450	739	769	078	122	42
155	169	435	455	744	775	084	128	43
159	173	439	460	750	781	090	134	44
.01164	.01178	.01444	.01466	.01755	.01786	.02095	.02140	45
168	182	449	471	760	792	101	146	46
173	187	454	476	766	798	107	153	47
177	191	459	481	771	803	113	159	48
182	196	464	486	777	809	119	165	49
.01186	.01200	.01469	.01491	.01782	.01815	.02125	.02171	50
191	205	474	496	788	820	131	178	51
195	209	479	501	793	826	137	184	52
200	214	484	506	799	832	143	190	53
204	219	489	512	804	837	149	196	54
.01209	.01223	.01494	.01517	.01810	.01843	.02155	.02203	55
213	228	499	522	815	849	161	209	56
218	233	504	527	821	854	167	215	57
222	237	509	532	826	860	173	221	58
227	242	514	537	832	866	179	228	59
.01231	.01247	.01519	.01543	.01837	.01872	.02185	.02234	60

M.	12°		13°		14°		15°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.02185	.02234	.02563	.02630	.02970	.03061	.03407	.03528	0
1	191	240	570	637	977	069	415	536	1
2	197	247	576	644	985	076	422	544	2
3	203	253	583	651	992	084	430	552	3
4	209	259	589	658	999	091	438	560	4
5	.02216	.02266	.02596	.02665	.03006	.03099	.03445	.03568	5
6	222	272	602	672	013	106	453	576	6
7	228	279	609	679	020	114	460	584	7
8	234	285	616	686	027	121	468	592	8
9	240	291	622	693	034	129	476	601	9
10	.02246	.02298	.02629	.02700	.03041	.03137	.03483	.03609	10
11	252	304	635	707	048	144	491	617	11
12	258	311	642	714	055	152	498	625	12
13	265	317	649	721	063	159	506	633	13
14	271	323	655	728	070	167	514	642	14
15	.02277	.02330	.02662	.02735	.03077	.03175	.03521	.03650	15
16	283	336	669	742	084	182	529	658	16
17	289	343	675	749	091	190	537	666	17
18	295	349	682	756	098	197	544	674	18
19	302	356	689	763	106	205	552	683	19
20	.02308	.02362	.02696	.02770	.03113	.03213	.03560	.03691	20
21	314	369	702	777	120	220	567	699	21
22	320	375	709	784	127	228	575	708	22
23	327	382	716	791	134	236	583	716	23
24	333	388	722	799	142	244	590	724	24
25	.02339	.02395	.02729	.02806	.03149	.03251	.03598	.03732	25
26	345	402	736	813	156	259	606	741	26
27	352	408	743	820	163	267	614	749	27
28	358	415	749	827	171	275	621	758	28
29	364	421	756	834	178	282	629	766	29
30	.02370	.02428	.02763	.02842	.03185	.03290	.03637	.03774	30
31	377	435	770	849	193	298	645	783	31
32	383	441	777	856	200	306	653	791	32
33	389	448	783	863	207	313	660	799	33
34	396	454	790	870	214	321	668	808	34
35	.02402	.02461	.02797	.02878	.03222	.03329	.03676	.03816	35
36	408	468	804	885	229	337	684	825	36
37	415	474	811	892	236	345	692	833	37
38	421	481	818	899	244	353	699	842	38
39	427	488	824	907	251	360	707	850	39
40	.02434	.02494	.02831	.02914	.03258	.03368	.03715	.03858	40
41	440	501	838	921	266	376	723	867	41
42	447	508	845	928	273	384	731	875	42
43	453	515	852	936	281	392	739	884	43
44	459	521	859	943	288	400	747	892	44
45	.02466	.02528	.02866	.02950	.03295	.03408	.03754	.03901	45
46	472	535	873	958	303	416	762	909	46
47	479	542	880	965	310	424	770	918	47
48	485	548	887	972	318	432	778	927	48
49	492	555	894	980	325	439	786	935	49
50	.02498	.02562	.02900	.02987	.03333	.03447	.03794	.03944	50
51	504	569	907	994	340	455	802	952	51
52	511	576	914	.03002	347	463	810	961	52
53	517	582	921	009	355	471	818	969	53
54	524	589	928	017	362	479	826	978	54
55	.02530	.02596	.02935	.03024	.03370	.03487	.03834	.03987	55
56	537	603	942	032	377	495	842	995	56
57	543	610	949	039	385	503	850	.04004	57
58	550	617	956	046	392	511	858	013	58
59	556	624	963	054	400	520	866	021	59
60	.02563	.02630	.02970	.03061	.03407	.03528	.03874	.04030	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS

M.	16°		17°		18°		19°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.03874	.04030	.04370	.04569	.04894	.05146	.05448	.05762	0
1	882	039	378	578	903	156	458	773	1
2	890	047	387	588	912	166	467	783	2
3	898	056	395	597	921	176	477	794	3
4	906	065	404	606	930	186	486	805	4
5	.03914	.04073	.04412	.04616	.04939	.05196	.05496	.05815	5
6	922	082	421	625	948	206	505	826	6
7	930	091	429	635	957	216	515	836	7
8	938	100	438	644	967	226	524	847	8
9	946	108	446	653	976	236	534	858	9
10	.03954	.04117	.04455	.04663	.04985	.05246	.05543	.05869	10
11	963	126	464	672	994	256	553	879	11
12	971	135	472	682	.05003	266	562	890	12
13	979	144	481	691	012	276	572	901	13
14	987	152	489	700	021	286	582	911	14
15	.03995	.04161	.04498	.04710	.05030	.05297	.05591	.05922	15
16	.04003	170	507	719	039	307	601	933	16
17	011	179	515	729	048	317	610	944	17
18	019	188	524	738	057	327	620	955	18
19	028	197	533	748	067	337	630	965	19
20	.04036	.04206	.04541	.04757	.05076	.05347	.05639	.05976	20
21	044	214	550	767	085	357	649	987	21
22	052	223	559	776	094	367	658	998	22
23	060	232	567	786	103	378	668	.06009	23
24	069	241	576	795	112	388	678	020	24
25	.04077	.04250	.04585	.04805	.05122	.05398	.05687	.06030	25
26	085	259	593	815	131	408	697	041	26
27	093	268	602	824	140	418	707	052	27
28	102	277	611	834	149	429	716	063	28
29	110	286	620	843	158	439	726	074	29
30	.04118	.04295	.04628	.04853	.05168	.05449	.05736	.06085	30
31	126	304	637	863	177	460	746	096	31
32	135	313	646	872	186	470	755	107	32
33	143	322	655	882	195	480	765	118	33
34	151	331	663	891	205	490	775	129	34
35	.04159	.04340	.04672	.04901	.05214	.05501	.05785	.06140	35
36	168	349	681	911	223	511	794	151	36
37	176	358	690	920	232	521	804	162	37
38	184	367	699	930	242	532	814	173	38
39	193	376	707	940	251	542	824	184	39
40	.04201	.04385	.04716	.04950	.05260	.05552	.05833	.06195	40
41	209	394	725	959	270	563	843	206	41
42	218	403	734	969	279	573	853	217	42
43	226	413	743	979	288	584	863	228	43
44	234	422	752	989	298	594	873	239	44
45	.04243	.04431	.04760	.04998	.05307	.05604	.05882	.06250	45
46	251	440	769	.05008	316	615	892	261	46
47	260	449	778	018	326	625	902	272	47
48	268	458	787	028	335	636	912	283	48
49	276	468	796	038	344	646	922	295	49
50	.04285	.04477	.04805	.05047	.05354	.05657	.05932	.06306	50
51	293	486	814	057	363	667	942	317	51
52	302	495	823	067	373	678	951	328	52
53	310	504	832	077	382	688	961	339	53
54	319	514	841	087	391	699	971	350	54
55	.04327	.04523	.04850	.05097	.05401	.05709	.05981	.06362	55
56	336	532	858	107	410	720	991	373	56
57	344	541	867	116	420	730	.06001	384	57
58	353	551	876	126	429	741	011	395	58
59	361	560	885	136	439	751	021	407	59
60	.04370	.04569	.04894	.05146	.05448	.05762	.06031	.06418	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECA

M	20°		21°		22°		23°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.
0	.06031	.06418	.06642	.07114	.07282	.07853	.07950	.08636
1	041	429	652	126	293	866	961	649
2	051	440	663	138	303	879	972	663
3	061	452	673	150	314	892	984	676
4	071	463	684	162	325	904	995	690
5	.06081	.06474	.06694	.07174	.07336	.07917	.08006	.08703
6	091	486	705	186	347	930	018	717
7	101	497	715	199	358	943	029	730
8	111	508	726	211	369	955	041	744
9	121	520	736	223	380	968	052	757
10	.06131	.06531	.06747	.07235	.07391	.07981	.08064	.08771
11	141	542	757	247	402	994	075	784
12	151	554	768	259	413	.08006	086	798
13	161	565	778	271	424	019	098	811
14	171	577	789	283	435	032	109	825
15	.06181	.06588	.06799	.07295	.07446	.08045	.08121	.08839
16	191	600	810	307	457	058	132	852
17	201	611	820	320	468	071	144	866
18	211	622	831	332	479	084	155	880
19	221	634	841	344	490	097	167	893
20	.06231	.06645	.06852	.07356	.07501	.08109	.08178	.08907
21	241	657	863	368	512	122	190	920
22	252	668	873	380	523	135	201	934
23	262	680	884	393	534	148	213	948
24	272	691	894	405	545	161	225	962
25	.06282	.06703	.06905	.07417	.07556	.08174	.08236	.08975
26	292	715	916	429	568	187	248	989
27	302	726	926	442	579	200	259	.09003
28	312	738	937	454	590	213	271	017
29	323	749	948	466	601	226	282	030
30	.06333	.06761	.06958	.07479	.07612	.08239	.08294	.09044
31	343	773	969	491	623	252	306	058
32	353	784	980	503	634	265	317	072
33	363	796	990	516	645	278	329	086
34	374	807	.07001	528	657	291	340	099
35	.06384	.06819	.07012	.07540	.07668	.08305	.08352	.09113
36	394	831	022	553	679	318	364	127
37	404	842	033	565	690	331	375	141
38	415	854	044	578	701	344	387	155
39	425	866	055	590	713	357	399	169
40	.06435	.06878	.07065	.07602	.07724	.08370	.08410	.09183
41	445	889	076	615	735	383	422	197
42	456	901	087	627	746	397	434	211
43	466	913	098	640	757	410	445	224
44	476	925	108	652	769	423	457	238
45	.06486	.06936	.07119	.07665	.07780	.08436	.08469	.09252
46	497	948	130	677	791	449	481	266
47	507	960	141	690	802	463	492	280
48	517	972	151	702	814	476	504	294
49	528	984	162	715	825	489	516	308
50	.06538	.06995	.07173	.07727	.07836	.08503	.08528	.09323
51	548	.07007	184	740	848	516	539	337
52	559	019	195	752	859	529	551	351
53	569	031	206	765	870	542	563	365
54	580	043	216	778	881	556	575	379
55	.06590	.07055	.07227	.07790	.07893	.08569	.08586	.09393
56	600	067	238	803	904	582	598	407
57	611	079	249	816	915	596	610	421
58	621	091	260	828	927	609	622	435
59	632	103	271	841	938	623	634	449
60	.06642	.07114	.07282	.07853	.07950	.08636	.08645	.09464

24°		25°		26°		27°		M.
Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
.08645	.09464	.09369	.10338	.10121	.11260	.10899	.12233	0
657	478	382	353	133	276	913	249	1
669	492	394	368	146	292	926	266	2
681	506	406	383	159	308	939	283	3
693	520	418	398	172	323	952	299	4
.08705	.09535	.09431	.10413	.10184	.11339	.10965	.12316	5
717	549	443	428	197	355	979	333	6
728	563	455	443	210	371	992	349	7
740	577	468	458	223	387	.11005	366	8
752	592	480	473	236	403	019	383	9
.08764	.09606	.09493	.10488	.10248	.11419	.11032	.12400	10
776	620	505	503	261	435	045	416	11
788	635	517	518	274	451	058	433	12
800	649	530	533	287	467	072	450	13
812	663	542	549	300	483	085	467	14
.08824	.09678	.09554	.10564	.10313	.11499	.11098	.12484	15
836	692	567	579	326	515	112	501	16
848	707	579	594	338	531	125	518	17
860	721	592	609	351	547	138	534	18
872	735	604	625	364	563	152	551	19
.08884	.09750	.09617	.10640	.10377	.11579	.11165	.12568	20
896	764	629	655	390	595	178	585	21
908	779	642	670	403	611	192	602	22
920	793	654	686	416	627	205	619	23
932	808	666	701	429	643	218	636	24
.08944	.09822	.09679	.10716	.10442	.11659	.11232	.12653	25
956	837	691	731	455	675	245	670	26
968	851	704	747	468	691	259	687	27
980	866	716	762	481	708	272	704	28
992	880	729	777	494	724	285	721	29
.09004	.09895	.09741	.10793	.10507	.11740	.11299	.12738	30
016	909	754	808	520	756	312	755	31
028	924	767	824	533	772	326	772	32
040	939	779	839	546	789	339	789	33
052	953	792	854	559	805	353	807	34
.09064	.09968	.09804	.10870	.10572	.11821	.11366	.12824	35
076	982	817	885	585	838	380	841	36
089	997	829	901	598	854	393	858	37
101	.10012	842	916	611	870	407	875	38
113	026	854	932	624	886	420	892	39
.09125	.10041	.09867	.10947	.10637	.11903	.11434	.12910	40
137	056	880	963	650	919	447	927	41
149	071	892	978	663	936	461	944	42
161	085	905	994	676	952	474	961	43
174	100	918	.11009	689	968	488	979	44
.09186	.10115	.09930	.11025	.10702	.11985	.11501	.12996	45
198	130	943	041	715	.12001	515	.13013	46
210	144	955	056	728	018	528	031	47
222	159	968	072	741	034	542	048	48
234	174	981	087	755	051	555	065	49
.09247	.10189	.09993	.11103	.10768	.12067	.11569	.13083	50
259	204	.10006	119	781	083	583	100	51
271	218	019	134	794	100	596	117	52
283	233	032	150	807	117	610	135	53
296	248	044	166	820	133	623	152	54
.09308	.10263	.10057	.11181	.10833	.12150	.11637	.13170	55
320	278	070	197	847	166	651	187	56
332	293	082	213	860	183	664	205	57
345	308	095	229	873	199	678	222	58
357	323	108	244	886	216	692	239	59
.09369	.10338	.10121	.11260	.10899	.12233	.11705	.13257	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SE

M.	28°		29°		30°		31°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exse
0	.11705	.13257	.12538	.14335	.13397	.15470	.14283	.1666
1	719	275	552	354	412	489	298	68
2	733	292	566	372	427	509	313	70
3	746	310	580	391	441	528	328	72
4	760	327	594	409	456	548	343	74
5	.11774	.13345	.12609	.14428	.13470	.15567	.14358	.1676
6	787	362	623	446	485	587	373	78
7	801	380	637	465	499	606	388	80
8	815	398	651	483	514	626	403	82
9	828	415	665	502	529	645	418	84
10	.11842	.13433	.12679	.14521	.13543	.15665	.14433	.1686
11	856	451	694	539	558	684	449	88
12	870	468	708	558	573	704	464	90
13	883	486	722	576	587	724	479	93
14	897	504	736	595	602	743	494	95
15	.11911	.13521	.12750	.14614	.13616	.15763	.14509	.1697
16	925	539	765	632	631	782	524	99
17	938	557	779	651	646	802	539	.1701
18	952	575	793	670	660	822	554	03
19	966	593	807	689	675	841	569	05
20	.11980	.13610	.12822	.14707	.13690	.15861	.14584	.1707
21	994	628	836	726	705	881	599	09
22	.12007	646	850	745	719	901	615	11
23	021	664	864	764	734	920	630	13
24	035	682	879	782	749	940	645	15
25	.12049	.13700	.12893	.14801	.13763	.15960	.14660	.1717
26	063	718	907	820	778	980	675	19
27	077	735	921	839	793	.16000	690	220
28	091	753	936	858	808	019	706	241
29	104	771	950	877	822	039	721	262
30	.12118	.13789	.12964	.14896	.13837	.16059	.14736	.17283
31	132	807	979	914	852	079	751	304
32	146	825	993	933	867	099	766	325
33	160	843	.13007	952	881	119	782	346
34	174	861	022	971	896	139	797	367
35	.12188	.13879	.13036	.14990	.13911	.16159	.14812	.17388
36	202	897	051	.15009	926	179	827	409
37	216	915	065	028	941	199	843	430
38	230	934	079	047	955	219	858	451
39	244	952	094	066	970	239	873	472
40	.12257	.13970	.13108	.15085	.13985	.16259	.14888	.17493
41	271	988	122	105	.14000	279	904	514
42	285	.14006	137	124	015	299	919	535
43	299	024	151	143	030	319	934	556
44	313	042	166	162	044	339	949	577
45	.12327	.14061	.13180	.15181	.14059	.16359	.14965	.17598
46	341	079	195	200	074	380	980	620
47	355	097	209	219	089	400	995	641
48	369	115	223	239	104	420	.15011	662
49	383	134	238	258	119	440	026	683
50	.12397	.14152	.13252	.15277	.14134	.16460	.15041	.17704
51	411	170	267	296	149	481	057	726
52	425	188	281	315	164	501	072	747
53	439	207	296	335	179	521	087	768
54	454	225	310	354	194	541	103	790
55	.12468	.14243	.13325	.15373	.14208	.16562	.15118	.17811
56	482	262	339	393	223	582	134	832
57	496	280	354	412	238	602	149	854
58	510	299	368	431	253	623	164	875
59	524	317	383	451	268	643	180	896
60	.12538	.14335	.13397	.15470	.14283	.16663	.15195	.17918

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

M.	32°		33°		34°		35°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.15195	.17918	.16133	.19236	.17096	.20622	.18085	.22077	0
1	211	939	149	259	113	645	101	102	1
2	226	961	165	281	129	669	118	127	2
3	241	982	181	304	145	693	135	152	3
4	257	.18004	196	327	161	717	152	177	4
5	.15272	.18025	.16212	.19349	.17178	.20740	.18168	.22202	5
6	288	047	228	372	194	764	185	227	6
7	303	068	244	394	210	788	202	252	7
8	319	090	260	417	227	812	218	277	8
9	334	111	276	440	243	836	235	302	9
0	.15350	.18133	.16292	.19463	.17259	.20859	.18252	.22327	10
1	365	155	308	485	276	883	269	352	11
2	381	176	324	508	292	907	286	377	12
3	396	198	340	531	308	931	302	402	13
4	412	220	355	553	325	955	319	428	14
5	.15427	.18241	.16371	.19576	.17341	.20979	.18336	.22453	15
6	443	263	387	599	357	.21003	353	478	16
7	458	285	403	622	374	027	369	503	17
8	474	307	419	645	390	051	386	528	18
9	489	328	435	668	407	075	403	554	19
0	.15505	.18350	.16451	.19691	.17423	.21099	.18420	.22579	20
1	520	372	467	713	439	123	437	604	21
2	536	394	483	736	456	147	454	629	22
3	552	416	499	759	472	171	470	655	23
4	567	437	515	782	489	195	487	680	24
5	.15583	.18459	.16531	.19805	.17505	.21220	.18504	.22706	25
6	598	481	547	828	522	244	521	731	26
7	614	503	563	851	538	268	538	756	27
8	630	525	579	874	554	292	555	782	28
9	645	547	595	897	571	316	572	807	29
0	.15661	.18569	.16611	.19920	.17587	.21341	.18588	.22833	30
1	676	591	627	944	604	365	605	858	31
2	692	613	644	967	620	389	622	884	32
3	708	635	660	990	637	414	639	909	33
4	723	657	676	.20013	653	438	656	935	34
5	.15739	.18679	.16692	.20036	.17670	.21462	.18673	.22960	35
6	755	701	708	059	686	487	690	986	36
7	770	723	724	083	703	511	707	.23012	37
8	786	745	740	106	719	535	724	037	38
9	802	767	756	129	736	560	741	063	39
0	.15818	.18790	.16772	.20152	.17752	.21584	.18758	.23089	40
1	833	812	788	176	769	609	775	114	41
2	849	834	805	199	786	633	792	140	42
3	865	856	821	222	802	658	809	166	43
4	880	878	837	246	819	682	826	192	44
5	.15896	.18901	.16853	.20269	.17835	.21707	.18843	.23217	45
6	912	923	869	292	852	731	860	243	46
7	928	945	885	316	868	756	877	269	47
8	943	967	902	339	885	781	894	295	48
9	959	990	918	363	902	805	911	321	49
0	.15975	.19012	.16934	.20386	.17918	.21830	.18928	.23347	50
1	991	034	950	410	935	855	945	373	51
2	.16006	057	966	433	952	879	962	398	52
3	022	079	983	457	968	904	979	424	53
4	038	102	999	480	985	929	996	450	54
5	.16054	.19124	.17015	.20504	.18001	.21953	.19013	.23476	55
6	070	146	031	527	018	978	030	502	56
7	085	169	047	551	035	.22003	047	529	57
8	101	191	064	575	051	028	064	555	58
9	117	214	080	598	068	053	081	581	59
0	.16133	.19236	.17096	.20622	.18085	.22077	.19098	.23607	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SEC

M.	36°		37°		38°		39°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.
0	.19098	.23607	.20136	.25214	.21199	.26902	.22285	.28676
1	115	633	154	241	217	931	304	706
2	133	659	171	269	235	960	322	737
3	150	685	189	296	253	988	340	767
4	167	711	207	324	271	.27017	359	797
5	.19184	.23738	.20224	.25351	.21289	.27046	.22377	.28828
6	201	764	242	379	306	075	395	858
7	218	790	259	406	324	104	414	889
8	235	816	277	434	342	133	432	919
9	252	843	294	462	360	162	450	950
10	.19270	.23869	.20312	.25489	.21378	.27191	.22469	.28980
11	287	895	329	517	396	221	487	.29011
12	304	922	347	545	414	250	506	042
13	321	948	365	572	432	279	524	072
14	338	975	382	600	450	308	542	103
15	.19356	.24001	.20400	.25628	.21468	.27337	.22561	.29133
16	373	028	417	656	486	366	579	164
17	390	054	435	683	504	396	598	195
18	407	081	453	711	522	425	616	226
19	424	107	470	739	540	454	634	256
20	.19442	.24134	.20488	.25767	.21558	.27483	.22653	.29287
21	459	160	506	795	576	513	671	318
22	476	187	523	823	595	542	690	349
23	493	213	541	851	613	572	708	380
24	511	240	559	879	631	601	727	411
25	.19528	.24267	.20576	.25907	.21649	.27630	.22745	.29442
26	545	293	594	935	667	660	764	473
27	562	320	612	963	685	689	782	504
28	580	347	629	991	703	719	801	535
29	597	373	647	.26019	721	748	819	566
30	.19614	.24400	.20665	.26047	.21739	.27778	.22838	.29597
31	632	427	682	075	757	807	856	628
32	649	454	700	104	775	837	875	659
33	666	481	718	132	794	867	893	690
34	684	508	736	160	812	896	912	721
35	.19701	.24534	.20753	.26188	.21830	.27926	.22930	.29752
36	718	561	771	216	848	956	949	784
37	736	588	789	245	866	985	967	815
38	753	615	807	273	884	.28015	986	846
39	770	642	824	301	902	045	.23004	877
40	.19788	.24669	.20842	.26330	.21921	.28075	.23023	.29909
41	805	696	860	358	939	105	041	940
42	822	723	878	387	957	134	060	971
43	840	750	895	415	975	164	079	.30003
44	857	777	913	443	993	194	097	034
45	.19875	.24804	.20931	.26472	.22012	.28224	.23116	.30066
46	892	832	949	500	030	254	134	097
47	909	859	967	529	048	284	153	129
48	927	886	984	557	066	314	172	160
49	944	913	.21002	586	084	344	190	192
50	.19962	.24940	.21020	.26615	.22103	.28374	.23209	.30223
51	979	967	038	643	121	404	228	255
52	997	995	056	672	139	434	246	287
53	.20014	.25022	074	701	157	464	265	318
54	032	049	092	729	176	495	283	350
55	.20049	.25077	.21109	.26758	.22194	.28525	.23302	.30382
56	066	104	127	787	212	555	321	413
57	084	131	145	815	231	585	339	445
58	101	159	163	844	249	615	358	477
59	119	186	181	873	267	646	377	509
60	.20136	.25214	.21199	.26902	.22285	.28676	.23396	.30541

'ABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

M.	40°		41°		42°		43°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.23396	.30541	.24529	.32501	.25686	.34563	.26865	.36733	0
1	414	573	548	535	705	599	884	770	1
2	433	605	567	568	724	634	904	807	2
3	452	636	586	602	744	669	924	844	3
4	470	668	605	636	763	704	944	881	4
5	.23489	.30700	.24625	.32669	.25783	.34740	.26964	.36919	5
6	508	732	644	703	802	775	984	956	6
7	527	764	663	737	822	811	.27004	993	7
8	545	796	682	770	841	846	024	.37030	8
9	564	829	701	804	861	882	043	068	9
10	.23583	.30861	.24720	.32838	.25880	.34917	.27063	.37105	10
11	602	893	739	872	900	953	083	143	11
12	620	925	759	905	920	988	103	180	12
13	639	957	778	939	939	.35024	123	218	13
14	658	989	797	973	959	060	143	255	14
15	.23677	.31022	.24816	.33007	.25978	.35095	.27163	.37293	15
16	696	054	835	041	998	131	183	330	16
17	714	086	854	075	.26017	167	203	368	17
18	733	119	874	109	037	203	223	406	18
19	752	151	893	143	056	238	243	443	19
20	.23771	.31183	.24912	.33177	.26076	.35274	.27263	.37481	20
21	790	216	931	211	096	310	283	519	21
22	808	248	950	245	115	346	303	556	22
23	827	281	970	279	135	382	323	594	23
24	846	313	989	314	154	418	343	632	24
25	.23865	.31346	.25008	.33348	.26174	.35454	.27363	.37670	25
26	884	378	027	382	194	490	383	708	26
27	903	411	047	416	213	526	403	746	27
28	922	443	066	451	233	562	423	784	28
29	941	476	085	485	253	598	443	822	29
30	.23959	.31509	.25104	.33519	.26272	.35634	.27463	.37860	30
31	978	541	124	554	292	670	483	898	31
32	997	574	143	588	312	707	503	936	32
33	.24016	607	162	622	331	743	523	974	33
34	035	640	182	657	351	779	543	.38012	34
35	.24054	.31672	.25201	.33691	.26371	.35815	.27563	.38051	35
36	073	705	220	726	390	852	583	089	36
37	092	738	240	760	410	888	603	127	37
38	111	771	259	795	430	924	623	165	38
39	130	804	278	830	449	961	643	204	39
40	.24149	.31837	.25297	.33864	.26469	.35997	.27663	.38242	40
41	168	870	317	899	489	.36034	683	280	41
42	187	903	336	934	509	070	703	319	42
43	206	936	356	968	528	107	723	357	43
44	225	969	375	.34003	548	143	743	396	44
45	.24244	.32002	.25394	.34038	.26568	.36180	.27764	.38434	45
46	262	035	414	073	587	217	784	473	46
47	281	068	433	108	607	253	804	512	47
48	300	101	452	142	627	290	824	550	48
49	320	134	472	177	647	327	844	589	49
50	.24339	.32168	.25491	.34212	.26667	.36363	.27864	.38628	50
51	358	201	511	247	686	400	884	666	51
52	377	234	530	282	706	437	905	705	52
53	396	267	549	317	726	474	925	744	53
54	415	301	569	352	746	511	945	783	54
55	.24434	.32334	.25588	.34387	.26766	.36548	.27965	.38822	55
56	453	368	608	423	785	585	985	860	56
57	472	401	627	458	805	622	.28005	899	57
58	491	434	647	493	825	659	026	938	58
59	510	468	666	528	845	696	046	977	59
60	.24529	.32501	.25686	.34563	.26865	.36733	.28066	.39016	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECA

M.	44°		45°		46°		47°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.
0	.28066	.39016	.29289	.41421	.30534	.43956	.31800	.46628
1	086	055	310	463	555	999	821	674
2	106	095	330	504	576	.44042	843	719
3	127	134	351	545	597	086	864	765
4	147	173	372	586	618	129	885	811
5	.28167	.39212	.29392	.41627	.30639	.44173	.31907	.46857
6	187	251	413	669	660	217	928	903
7	208	291	433	710	681	260	949	949
8	228	330	454	752	702	304	971	995
9	248	369	475	793	723	347	992	.47041
10	.28268	.39409	.29495	.41835	.30744	.44391	.32013	.47087
11	289	448	516	876	765	435	035	134
12	309	487	537	918	786	479	056	180
13	329	527	557	959	807	523	077	226
14	350	566	578	.42001	828	567	099	272
15	.28370	.39606	.29599	.42042	.30849	.44610	.32120	.47319
16	390	646	619	084	870	654	141	365
17	410	685	640	126	891	698	163	411
18	431	725	661	168	912	742	184	458
19	451	764	681	209	933	787	205	504
20	.28471	.39804	.29702	.42251	.30954	.44831	.32227	.47551
21	492	844	723	293	975	875	248	598
22	512	884	743	335	996	919	270	644
23	532	924	764	377	.31017	963	291	691
24	553	963	785	419	038	.45007	312	738
25	.28573	.40003	.29805	.42461	.31059	.45052	.32334	.47784
26	593	043	826	503	080	096	355	831
27	614	083	847	545	101	141	377	878
28	634	123	868	587	122	185	398	925
29	655	163	888	630	143	229	420	972
30	.28675	.40203	.29909	.42672	.31165	.45274	.32441	.48019
31	695	243	930	714	186	319	462	066
32	716	283	951	756	207	363	484	113
33	736	324	971	799	228	408	505	160
34	757	364	992	841	249	452	527	207
35	.28777	.40404	.30013	.42883	.31270	.45497	.32548	.48254
36	797	444	034	926	291	542	570	301
37	818	485	054	968	312	587	591	349
38	838	525	075	.43011	334	631	613	396
39	859	565	096	053	355	676	634	443
40	.28879	.40606	.30117	.43096	.31376	.45721	.32656	.48491
41	900	646	138	139	397	766	677	538
42	920	687	158	181	418	811	699	586
43	941	727	179	224	439	856	720	633
44	961	768	200	267	461	901	742	681
45	.28981	.40808	.30221	.43309	.31482	.45946	.32763	.48728
46	.29002	849	242	352	503	992	785	776
47	022	890	263	395	524	.46037	806	824
48	043	930	283	438	545	082	828	871
49	063	971	304	481	566	127	849	919
50	.29084	.41012	.30325	.43524	.31588	.46173	.32871	.48967
51	104	053	346	567	609	218	893	.49015
52	125	093	367	610	630	263	914	063
53	145	134	388	653	651	309	936	111
54	166	175	409	696	673	354	957	159
55	.29187	.41216	.30430	.43739	.31694	.46400	.32979	.49207
56	207	257	451	783	715	445	.33001	255
57	228	298	471	826	736	491	022	303
58	248	339	492	869	758	537	044	351
59	269	380	513	912	779	582	065	399
60	.29289	.41421	.30534	.43956	.31800	.46628	.33087	.49448

48°		49°		50°		51°		M.
Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
.33087	.49448	.34394	.52425	.35721	.55572	.37068	.58902	0
109	496	416	476	744	626	091	959	1
130	544	438	527	766	680	113	.59016	2
152	593	460	579	788	734	136	073	3
173	641	482	630	810	789	158	130	4
.33195	.49690	.34504	.52681	.35833	.55843	.37181	.59188	5
217	738	526	732	855	897	204	245	6
238	787	548	784	877	951	226	302	7
260	835	570	835	900	.56005	249	360	8
282	884	592	886	922	060	272	418	9
.33303	.49933	.34614	.52938	.35944	.56114	.37294	.59475	10
325	981	636	989	967	169	317	533	11
347	.50030	658	.53041	989	223	340	590	12
368	079	680	092	.36011	278	362	648	13
390	128	702	144	034	332	385	706	14
.33412	.50177	.34724	.53196	.36056	.56387	.37408	.59764	15
434	226	746	247	078	442	430	822	16
455	275	768	299	101	497	453	880	17
477	324	790	351	123	551	476	938	18
499	373	812	403	146	606	498	996	19
.33520	.50422	.34834	.53455	.36168	.56661	.37521	.60054	20
542	471	856	507	190	716	544	112	21
564	521	878	559	213	771	567	171	22
586	570	900	611	235	826	589	229	23
607	619	923	663	258	881	612	287	24
.33629	.50669	.34945	.53715	.36280	.56937	.37635	.60346	25
651	718	967	768	302	992	658	404	26
673	767	989	820	325	.57047	680	463	27
694	817	.35011	872	347	103	703	521	28
716	866	033	924	370	158	726	580	29
.33738	.50916	.35055	.53977	.36392	.57213	.37749	.60639	30
760	966	077	.54029	415	269	771	698	31
782	.51015	099	082	437	324	794	756	32
803	065	122	134	460	380	817	815	33
825	115	144	187	482	436	840	874	34
.33847	.51165	.35166	.54240	.36504	.57491	.37862	.60933	35
869	215	188	292	527	547	885	992	36
891	265	210	345	549	603	908	.61051	37
912	314	232	398	572	659	931	111	38
934	364	254	451	594	715	954	170	39
.33956	.51415	.35277	.54504	.36617	.57771	.37976	.61229	40
978	465	299	557	639	827	999	288	41
.34000	515	321	610	662	883	.38022	348	42
022	565	343	663	684	939	045	407	43
044	615	365	716	707	995	068	467	44
.34065	.51665	.35388	.54769	.36729	.58051	.38091	.61526	45
087	716	410	822	752	108	113	586	46
109	766	432	876	775	164	136	646	47
131	817	454	929	797	221	159	705	48
153	867	476	982	820	277	182	765	49
.34175	.51918	.35499	.55036	.36842	.58333	.38205	.61825	50
197	968	521	089	865	390	228	885	51
219	.52019	543	143	887	447	251	945	52
241	069	565	196	910	503	274	.62005	53
262	120	588	250	932	560	296	065	54
.34284	.52171	.35610	.55303	.36955	.58617	.38319	.62125	55
306	222	632	357	978	674	342	185	56
328	273	654	411	.37000	731	365	246	57
350	323	677	465	023	788	388	306	58
372	374	699	518	045	845	411	366	59
.34394	.52425	.35721	.55572	.37068	.58902	.38434	.62427	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

M.	52°		53°		54°		55°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.38434	.62427	.39818	.66164	.41221	.70130	.42642	.74345	0
1	457	487	842	228	245	198	666	417	1
2	480	548	865	292	269	267	690	490	2
3	503	609	888	357	292	335	714	562	3
4	526	669	911	421	316	403	738	635	4
5	.38549	.62730	.39935	.66486	.41339	.70472	.42762	.74708	5
6	571	791	958	550	363	540	785	781	6
7	594	852	981	615	386	609	809	854	7
8	617	913	.40005	679	410	677	833	927	8
9	640	974	028	744	433	746	857	.75000	9
10	.38663	.63035	.40051	.66809	.41457	.70815	.42881	.75073	10
11	686	096	074	873	481	884	905	146	11
12	709	157	098	938	504	953	929	219	12
13	732	218	121	.67003	528	.71022	953	293	13
14	755	279	144	068	551	091	976	366	14
15	.38778	.63341	.40168	.67133	.41575	.71160	.43000	.75440	15
16	801	402	191	198	599	229	024	513	16
17	824	464	214	264	622	298	048	587	17
18	847	525	237	329	646	368	072	661	18
19	870	587	261	394	670	437	096	734	19
20	.38893	.63648	.40284	.67460	.41693	.71506	.43120	.75808	20
21	916	710	307	525	717	576	144	882	21
22	939	772	331	591	740	646	168	956	22
23	962	834	354	656	764	715	192	.76031	23
24	985	895	378	722	788	785	216	105	24
25	.39009	.63957	.40401	.67788	.41811	.71855	.43240	.76179	25
26	032	.64019	424	853	835	925	264	253	26
27	055	081	448	919	859	995	287	328	27
28	078	144	471	985	882	.72065	311	402	28
29	101	206	494	.68051	906	135	335	477	29
30	.39124	.64268	.40518	.68117	.41930	.72205	.43359	.76552	30
31	147	330	541	183	953	275	383	626	31
32	170	393	564	250	977	346	407	701	32
33	193	455	588	316	.42001	416	431	776	33
34	216	518	611	382	024	487	455	851	34
35	.39239	.64580	.40635	.68449	.42048	.72557	.43479	.76926	35
36	262	643	658	515	072	628	503	.77001	36
37	286	705	682	582	096	698	527	077	37
38	309	768	705	648	119	769	551	152	38
39	332	831	728	715	143	840	575	227	39
40	.39355	.64894	.40752	.68782	.42167	.72911	.43599	.77303	40
41	378	957	775	848	190	982	623	378	41
42	401	.65020	799	915	214	.73053	647	454	42
43	424	083	822	982	238	124	671	530	43
44	447	146	846	.69049	262	195	695	606	44
45	.39471	.65209	.40869	.69116	.42285	.73267	.43720	.77681	45
46	494	272	892	183	309	338	744	757	46
47	517	335	916	250	333	409	768	833	47
48	540	399	939	318	357	481	792	910	48
49	563	462	963	385	381	552	816	986	49
50	.39586	.65526	.40986	.69452	.42404	.73624	.43840	.78062	50
51	610	589	.41010	520	428	696	864	138	51
52	633	653	033	587	452	768	888	215	52
53	656	717	057	655	476	840	912	291	53
54	679	780	080	723	499	911	936	368	54
55	.39702	.65844	.41104	.69790	.42523	.73983	.43960	.78445	55
56	726	908	127	858	547	.74056	984	521	56
57	749	972	151	926	571	128	.44008	598	57
58	772	.66036	174	994	595	200	032	675	58
59	795	100	198	.70062	619	272	057	752	59
60	.39818	.66164	.41221	.70130	.42642	.74345	.44081	.78829	60

LE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

56°		57°		58°		59°		M.
Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
.44081	.78829	.45536	.83608	.47008	.88708	.48496	.94160	0
105	906	560	690	033	796	521	254	1
129	984	585	773	057	884	546	349	2
153	.79061	609	855	082	972	571	443	3
177	138	634	938	107	.89060	596	537	4
.44201	.79216	.45658	.84020	.47131	.89148	.48621	.94632	5
225	293	683	103	156	237	646	726	6
250	371	707	186	181	325	671	821	7
274	449	731	269	206	414	696	916	8
298	527	756	352	230	503	721	.95011	9
.44322	.79604	.45780	.84435	.47255	.89591	.48746	.95106	10
346	682	805	518	280	680	771	201	11
370	761	829	601	304	769	796	296	12
395	839	854	685	329	858	821	392	13
419	917	878	768	354	948	846	487	14
.44443	.79995	.45903	.84852	.47379	.90037	.48871	.95583	15
467	.80074	927	935	403	126	896	678	16
491	152	951	.85019	428	216	921	774	17
516	231	976	103	453	305	946	870	18
540	309	.46000	187	478	395	971	966	19
.44564	.80388	.46025	.85271	.47502	.90485	.48996	.96062	20
588	467	049	355	527	575	.49021	158	21
612	546	074	439	552	665	046	255	22
637	625	098	523	577	755	071	351	23
661	704	123	608	601	845	096	448	24
.44685	.80783	.46147	.85692	.47626	.90935	.49121	.96544	25
709	862	172	777	651	.91026	146	641	26
734	942	196	861	676	116	171	738	27
758	.81021	221	946	701	207	196	835	28
782	101	246	.86031	725	297	221	932	29
.44806	.81180	.46270	.86116	.47750	.91388	.49246	.97029	30
831	260	295	201	775	479	271	127	31
855	340	319	286	800	570	296	224	32
879	419	344	371	825	661	321	322	33
903	499	368	457	849	752	346	420	34
.44928	.81579	.46393	.86542	.47874	.91844	.49372	.97517	35
952	659	417	627	899	935	397	615	36
976	740	442	713	924	.92027	422	713	37
.45001	820	466	799	949	118	447	811	38
025	900	491	885	974	210	472	910	39
.45049	.81981	.46516	.86970	.47998	.92302	.49497	.98008	40
073	.82061	540	.87056	.48023	394	522	107	41
098	142	565	142	048	486	547	205	42
122	222	589	229	073	578	572	304	43
146	303	614	315	098	670	597	403	44
.45171	.82384	.46639	.87401	.48123	.92762	.49623	.98502	45
195	465	663	488	148	855	648	601	46
219	546	688	574	172	947	673	700	47
244	627	712	661	197	.93040	698	799	48
268	709	737	748	222	133	723	899	49
.45292	.82790	.46762	.87834	.48247	.93226	.49748	.98998	50
317	871	786	921	272	319	773	.99098	51
341	953	811	.88008	297	412	799	198	52
365	.83034	836	095	322	505	824	298	53
390	116	860	183	347	598	849	398	54
.45414	.83198	.46885	.88270	.48372	.93692	.49874	.99498	55
439	280	909	357	396	785	899	598	56
463	362	934	445	421	879	924	698	57
487	444	959	532	446	973	950	799	58
512	526	983	620	471	.94066	975	899	59
.45536	.83608	.47008	.88708	.48496	.94160	.50000	1.00000	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

M.	60°		61°		62°		63°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.50000	1.00000	.51519	1.06267	.53053	1.13005	.54601	1.20269	0
1	025	.00101	544	.06375	079	.13122	627	.20395	1
2	050	.00202	570	.06483	104	.13239	653	.20521	2
3	076	.00303	595	.06592	130	.13356	679	.20647	3
4	101	.00404	621	.06701	156	.13473	705	.20773	4
5	.50126	1.00505	.51646	1.06809	.53181	1.13590	.54731	1.20900	5
6	151	.00607	672	.06918	207	.13707	757	.21026	6
7	176	.00708	697	.07027	233	.13825	782	.21153	7
8	202	.00810	723	.07137	258	.13942	808	.21280	8
9	227	.00912	748	.07246	284	.14060	834	.21407	9
10	.50252	1.01014	.51774	1.07356	.53310	1.14178	.54860	1.21535	10
11	277	.01116	799	.07465	336	.14296	886	.21662	11
12	303	.01218	825	.07575	361	.14414	912	.21790	12
13	328	.01320	850	.07685	387	.14533	938	.21918	13
14	353	.01422	876	.07795	413	.14651	964	.22045	14
15	.50378	1.01525	.51901	1.07905	.53439	1.14770	.54990	1.22174	15
16	404	.01628	927	.08015	464	.14889	.55016	.22302	16
17	429	.01730	952	.08126	490	.15008	042	.22430	17
18	454	.01833	978	.08236	516	.15127	068	.22559	18
19	479	.01936	.52003	.08347	542	.15246	094	.22688	19
20	.50505	1.02039	.52029	1.08458	.53567	1.15366	.55120	1.22817	20
21	530	.02143	054	.08569	593	.15485	146	.22946	21
22	555	.02246	080	.08680	619	.15605	172	.23075	22
23	581	.02349	105	.08791	645	.15725	198	.23205	23
24	606	.02453	131	.08903	670	.15845	224	.23334	24
25	.50631	1.02557	.52156	1.09014	.53696	1.15965	.55250	1.23464	25
26	656	.02661	182	.09126	722	.16085	276	.23594	26
27	682	.02765	207	.09238	748	.16206	302	.23724	27
28	707	.02869	233	.09350	774	.16326	328	.23855	28
29	732	.02973	259	.09462	799	.16447	354	.23985	29
30	.50758	1.03077	.52284	1.09574	.53825	1.16568	.55380	1.24116	30
31	783	.03182	310	.09686	851	.16689	406	.24247	31
32	808	.03286	335	.09799	877	.16810	432	.24378	32
33	834	.03391	361	.09911	903	.16932	458	.24509	33
34	859	.03496	386	.10024	928	.17053	484	.24640	34
35	.50884	1.03601	.52412	1.10137	.53954	1.17175	.55510	1.24772	35
36	910	.03706	438	.10250	980	.17297	536	.24903	36
37	935	.03811	463	.10363	.54006	.17419	563	.25035	37
38	960	.03916	489	.10477	032	.17541	589	.25167	38
39	986	.04022	514	.10590	058	.17663	615	.25300	39
40	.51011	1.04128	.52540	1.10704	.54083	1.17786	.55641	1.25432	40
41	036	.04233	566	.10817	109	.17909	667	.25565	41
42	062	.04339	591	.10931	135	.18031	693	.25697	42
43	087	.04445	617	.11045	161	.18154	719	.25830	43
44	112	.04551	642	.11159	187	.18277	745	.25963	44
45	.51138	1.04657	.52668	1.11274	.54213	1.18401	.55771	1.26097	45
46	163	.04764	694	.11388	238	.18524	797	.26230	46
47	189	.04870	719	.11503	264	.18648	823	.26364	47
48	214	.04977	745	.11617	290	.18772	849	.26498	48
49	239	.05084	771	.11732	316	.18895	876	.26632	49
50	.51265	1.05191	.52796	1.11847	.54342	1.19019	.55902	1.26766	50
51	290	.05298	822	.11963	368	.19144	928	.26900	51
52	316	.05405	847	.12078	394	.19268	954	.27035	52
53	341	.05512	873	.12193	420	.19393	980	.27169	53
54	366	.05619	899	.12309	446	.19517	.56006	.27304	54
55	.51392	1.05727	.52924	1.12425	.54471	1.19642	.56032	1.27439	55
56	417	.05835	950	.12540	497	.19767	058	.27574	56
57	443	.05942	976	.12657	523	.19892	084	.27710	57
58	468	.06050	.53001	.12773	549	.20018	111	.27845	58
59	494	.06158	027	.12889	575	.20143	137	.27981	59
60	.51519	1.06267	.53053	1.13005	.54601	1.20269	.56163	1.28117	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS.

M.	64°		65°		66°		67°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.56163	1.28117	.57738	1.36620	.59326	1.45859	.60927	1.55930	0
1	189	.28253	765	.36768	353	.46020	954	.56106	1
2	215	.28390	791	.36916	379	.46181	980	.56282	2
3	241	.28526	817	.37064	406	.46342	.61007	.56458	3
4	267	.28663	844	.37212	433	.46504	034	.56634	4
5	.56294	1.28800	.57870	1.37361	.59459	1.46665	.61061	1.56811	5
6	320	.28937	896	.37509	486	.46827	088	.56988	6
7	346	.29074	923	.37658	512	.46989	114	.57165	7
8	372	.29211	949	.37808	539	.47152	141	.57342	8
9	398	.29349	976	.37957	566	.47314	168	.57520	9
10	.56425	1.29487	.58002	1.38107	.59592	1.47477	.61195	1.57698	10
11	451	.29625	028	.38256	619	.47640	222	.57876	11
12	477	.29763	055	.38406	645	.47804	248	.58054	12
13	503	.29901	081	.38556	672	.47967	275	.58233	13
14	529	.30040	108	.38707	699	.48131	302	.58412	14
15	.56555	1.30179	.58134	1.38857	.59725	1.48295	.61329	1.58591	15
16	582	.30318	160	.39008	752	.48459	356	.58771	16
17	608	.30457	187	.39159	779	.48624	383	.58950	17
18	634	.30596	213	.39311	805	.48789	409	.59130	18
19	660	.30735	240	.39462	832	.48954	436	.59311	19
20	.56687	1.30875	.58266	1.39614	.59859	1.49119	.61463	1.59491	20
21	713	.31015	293	.39766	885	.49284	490	.59672	21
22	739	.31155	319	.39918	912	.49450	517	.59853	22
23	765	.31295	345	.40070	938	.49616	544	.60035	23
24	791	.31436	372	.40222	965	.49782	570	.60217	24
25	.56818	1.31576	.58398	1.40375	.59992	1.49948	.61597	1.60399	25
26	844	.31717	425	.40528	.60018	.50115	624	.60581	26
27	870	.31858	451	.40681	045	.50282	651	.60763	27
28	896	.31999	478	.40835	072	.50449	678	.60946	28
29	923	.32140	504	.40988	098	.50617	705	.61129	29
30	.56949	1.32282	.58531	1.41142	.60125	1.50784	.61732	1.61313	30
31	975	.32424	557	.41296	152	.50952	759	.61496	31
32	.57001	.32566	584	.41450	178	.51120	785	.61680	32
33	028	.32708	610	.41605	205	.51289	812	.61864	33
34	054	.32850	637	.41760	232	.51457	839	.62049	34
35	.57080	1.32993	.58663	1.41914	.60259	1.51626	.61866	1.62234	35
36	106	.33135	690	.42070	285	.51795	893	.62419	36
37	133	.33278	716	.42225	312	.51965	920	.62604	37
38	159	.33422	743	.42380	339	.52134	947	.62790	38
39	185	.33565	769	.42536	365	.52304	974	.62976	39
40	.57212	1.33708	.58796	1.42692	.60392	1.52474	.62001	1.63162	40
41	238	.33852	822	.42848	419	.52645	027	.63348	41
42	264	.33996	849	.43005	445	.52815	054	.63535	42
43	291	.34140	875	.43162	472	.52986	081	.63722	43
44	317	.34284	902	.43318	499	.53157	108	.63909	44
45	.57343	1.34429	.58928	1.43476	.60526	1.53329	.62135	1.64097	45
46	369	.34573	955	.43633	552	.53500	162	.64285	46
47	396	.34718	981	.43790	579	.53672	189	.64473	47
48	422	.34863	.59008	.43948	606	.53845	216	.64662	48
49	448	.35009	034	.44106	633	.54017	243	.64851	49
50	.57475	1.35154	.59061	1.44264	.60659	1.54190	.62270	1.65040	50
51	501	.35300	087	.44423	686	.54363	297	.65229	51
52	527	.35446	114	.44582	713	.54536	324	.65419	52
53	554	.35592	140	.44741	740	.54709	351	.65609	53
54	580	.35738	167	.44900	766	.54883	378	.65799	54
55	.57606	1.35885	.59194	1.45059	.60793	1.55057	.62405	1.65989	55
56	633	.36031	220	.45219	820	.55231	431	.66180	56
57	659	.36178	247	.45378	847	.55405	458	.66371	57
58	685	.36325	273	.45539	873	.55580	485	.66563	58
59	712	.36473	300	.45699	900	.55755	512	.66755	59
60	.57738	1.36620	.59326	1.45859	.60927	1.55930	.62539	1.66947	60

M.	68°		69°		70°		71°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.
0	.62539	1.66947	.64163	1.79043	.65798	1.92380	.67443	2.07155
1	566	.67139	190	.79254	825	.92614	471	.07415
2	593	.67332	218	.79466	853	.92849	498	.07675
3	620	.67525	245	.79679	880	.93083	526	.07936
4	647	.67718	272	.79891	907	.93318	553	.08197
5	.62674	1.67911	.64299	1.80104	.65935	1.93554	.67581	2.08459
6	701	.68105	326	.80318	962	.93790	608	.08721
7	728	.68299	353	.80531	989	.94026	636	.08983
8	755	.68494	381	.80746	.66017	.94263	663	.09246
9	782	.68689	408	.80960	044	.94500	691	.09510
10	.62809	1.68884	.64435	1.81175	.66071	1.94737	.67718	2.09774
11	836	.69079	462	.81390	099	.94975	746	.10038
12	863	.69275	489	.81605	126	.95213	773	.10303
13	890	.69471	516	.81821	154	.95452	801	.10568
14	917	.69667	544	.82037	181	.95691	829	.10834
15	.62944	1.69864	.64571	1.82254	.66208	1.95931	.67856	2.11101
16	971	.70061	598	.82471	236	.96171	884	.11367
17	998	.70258	625	.82688	263	.96411	911	.11635
18	.63025	.70455	653	.82906	290	.96652	939	.11903
19	052	.70653	680	.83124	318	.96893	966	.12171
20	.63079	1.70851	.64707	1.83342	.66345	1.97135	.67994	2.12440
21	106	.71050	734	.83561	373	.97377	.68021	.12709
22	133	.71249	761	.83780	400	.97619	049	.12979
23	161	.71448	789	.83999	427	.97862	077	.13249
24	188	.71647	816	.84219	455	.98106	104	.13520
25	.63215	1.71847	.64843	1.84439	.66482	1.98349	.68132	2.13791
26	242	.72047	870	.84659	510	.98594	159	.14063
27	269	.72247	898	.84880	537	.98838	187	.14335
28	296	.72448	925	.85102	564	.99083	214	.14608
29	323	.72649	952	.85323	592	.99329	242	.14881
30	.63350	1.72850	.64979	1.85545	.66619	1.99574	.68270	2.15155
31	377	.73052	.65007	.85767	647	.99821	297	.15429
32	404	.73254	034	.85990	674	2.00067	325	.15704
33	431	.73456	061	.86213	702	.00315	352	.15979
34	458	.73659	088	.86437	729	.00562	380	.16255
35	.63485	1.73862	.65116	1.86661	.66756	2.00810	.68407	2.16531
36	512	.74065	143	.86885	784	.01059	435	.16808
37	539	.74269	170	.87109	811	.01308	463	.17085
38	566	.74473	197	.87334	839	.01557	490	.17363
39	594	.74677	225	.87560	866	.01807	518	.17641
40	.63621	1.74881	.65252	1.87785	.66894	2.02057	.68546	2.17920
41	648	.75086	279	.88011	921	.02308	573	.18199
42	675	.75292	306	.88238	949	.02559	601	.18479
43	702	.75497	334	.88465	976	.02810	628	.18759
44	729	.75703	361	.88692	.67003	.03062	656	.19040
45	.63756	1.75909	.65388	1.88920	.67031	2.03315	.68684	2.19322
46	783	.76116	416	.89148	058	.03568	711	.19604
47	810	.76323	443	.89376	086	.03821	739	.19886
48	838	.76530	470	.89605	113	.04075	767	.20169
49	865	.76737	497	.89834	141	.04329	794	.20453
50	.63892	1.76945	.65525	1.90063	.67168	2.04584	.68822	2.20737
51	919	.77154	552	.90293	196	.04839	849	.21021
52	946	.77362	579	.90524	223	.05094	877	.21306
53	973	.77571	607	.90754	251	.05350	905	.21592
54	.64000	.77780	634	.90986	278	.05607	932	.21878
55	.64027	1.77990	.65661	1.91217	.67306	2.05864	.68960	2.22165
56	055	.78200	689	.91449	333	.06121	988	.22452
57	082	.78410	716	.91681	361	.06379	.69015	.22740
58	109	.78621	743	.91914	388	.06637	043	.23028
59	136	.78832	771	.92147	416	.06896	071	.23317
60	.64163	1.79043	.65798	1.92380	.67443	2.07155	.69098	2.23607

72°		73°		74°		75°		M.
Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
.69098	2.23607	.70763	2.42030	.72436	2.62796	.74118	2.86370	0
126	.23897	791	.42356	464	.63164	146	.86790	1
154	.24187	818	.42683	492	.63533	174	.87211	2
181	.24478	846	.43010	520	.63903	202	.87633	3
209	.24770	874	.43337	548	.64274	231	.88056	4
.69237	2.25062	.70902	2.43666	.72576	2.64645	.74259	2.88479	5
264	.25355	930	.43995	604	.65018	287	.88904	6
292	.25648	958	.44324	632	.65391	315	.89330	7
320	.25942	985	.44655	660	.65765	343	.89756	8
347	.26237	.71013	.44986	688	.66140	371	.90184	9
.69375	2.26531	.71041	2.45317	.72716	2.66515	.74399	2.90613	10
403	.26827	069	.45650	744	.66892	427	.91042	11
430	.27123	097	.45983	772	.67269	455	.91473	12
458	.27420	125	.46316	800	.67647	484	.91904	13
486	.27717	153	.46651	828	.68025	512	.92337	14
.69514	2.28015	.71180	2.46986	.72856	2.68405	.74540	2.92770	15
541	.28313	208	.47321	884	.68785	568	.93204	16
569	.28612	236	.47658	912	.69167	596	.93640	17
597	.28912	264	.47995	940	.69549	624	.94076	18
624	.29212	292	.48333	968	.69931	652	.94514	19
.69652	2.29512	.71320	2.48671	.72996	2.70315	.74680	2.94952	20
680	.29814	348	.49010	.73024	.70700	709	.95392	21
708	.30115	375	.49350	052	.71085	737	.95832	22
735	.30418	403	.49691	080	.71471	765	.96274	23
763	.30721	431	.50032	108	.71858	793	.96716	24
.69791	2.31024	.71459	2.50374	.73136	2.72246	.74821	2.97160	25
818	.31328	487	.50716	164	.72635	849	.97604	26
846	.31633	515	.51060	192	.73024	878	.98050	27
874	.31939	543	.51404	220	.73414	906	.98497	28
902	.32244	571	.51748	248	.73806	934	.98944	29
.69929	2.32551	.71598	2.52094	.73276	2.74198	.74962	2.99393	30
957	.32858	626	.52440	304	.74591	990	.99843	31
985	.33166	654	.52787	332	.74984	.75018	3.00293	32
.70013	.33474	682	.53134	360	.75379	046	.00745	33
040	.33783	710	.53482	388	.75775	075	.01198	34
.70068	2.34092	.71738	2.53831	.73416	2.76171	.75103	3.01652	35
096	.34403	766	.54181	444	.76568	131	.02107	36
124	.34713	794	.54531	472	.76966	159	.02563	37
151	.35025	822	.54883	500	.77365	187	.03020	38
179	.35336	850	.55234	529	.77765	216	.03479	39
.70207	2.35649	.71877	2.55587	.73557	2.78166	.75244	3.03938	40
235	.35962	905	.55940	585	.78568	272	.04398	41
263	.36276	933	.56294	613	.78970	300	.04860	42
290	.36590	961	.56649	641	.79374	328	.05322	43
318	.36905	989	.57005	669	.79778	356	.05786	44
.70346	2.37221	.72017	2.57361	.73697	2.80183	.75385	3.06251	45
374	.37537	045	.57718	725	.80589	413	.06717	46
401	.37854	073	.58076	753	.80996	441	.07184	47
429	.38171	101	.58434	781	.81404	469	.07652	48
457	.38489	129	.58794	809	.81813	497	.08121	49
.70485	2.38808	.72157	2.59154	.73837	2.82223	.75526	3.08591	50
513	.39128	185	.59514	865	.82633	554	.09063	51
540	.39448	213	.59876	893	.83045	582	.09535	52
568	.39768	241	.60238	921	.83457	610	.10009	53
596	.40089	269	.60601	950	.83871	638	.10484	54
.70624	2.40411	.72296	2.60965	.73978	2.84285	.75667	3.10960	55
652	.40734	324	.61330	.74006	.84700	695	.11437	56
679	.41057	352	.61695	034	.85116	723	.11915	57
707	.41381	380	.62061	062	.85533	751	.12394	58
735	.41705	408	.62428	090	.85951	780	.12875	59
.70763	2.42030	.72436	2.62796	.74118	2.86370	.75808	3.13357	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECA

M.	76°		77°		78°		79°	
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.
0	.75808	3.13357	.77505	3.44541	.79209	3.80973	.80919	4.24084
1	836	.13839	533	.45102	237	.81633	948	.24870
2	864	.14323	562	.45664	266	.82294	976	.25658
3	892	.14809	590	.46228	294	.82956	.81005	.26448
4	921	.15295	618	.46793	323	.83621	033	.27241
5	.75949	3.15782	.77647	3.47360	.79351	3.84288	.81062	4.28036
6	977	.16271	675	.47928	380	.84956	090	.28833
7	.76005	.16761	703	.48498	408	.85627	119	.29634
8	034	.17252	732	.49069	437	.86299	148	.30436
9	062	.17744	760	.49642	465	.86973	176	.31241
10	.76090	3.18238	.77788	3.50216	.79493	3.87649	.81205	4.32049
11	118	.18733	817	.50791	522	.88327	233	.32859
12	147	.19228	845	.51368	550	.89007	262	.33671
13	175	.19725	874	.51947	579	.89689	290	.34486
14	203	.20224	902	.52527	607	.90373	319	.35304
15	.76231	3.20723	.77930	3.53109	.79636	3.91058	.81348	4.36124
16	260	.21224	959	.53692	664	.91746	376	.36947
17	288	.21726	987	.54277	693	.92436	405	.37772
18	316	.22229	.78015	.54863	721	.93128	433	.38600
19	344	.22734	044	.55451	750	.93821	462	.39430
20	.76373	3.23239	.78072	3.56041	.79778	3.94517	.81491	4.40263
21	401	.23746	101	.56632	807	.95215	519	.41099
22	429	.24255	129	.57224	835	.95914	548	.41937
23	458	.24764	157	.57819	864	.96616	576	.42778
24	486	.25275	186	.58414	892	.97320	605	.43622
25	.76514	3.25787	.78214	3.59012	.79921	3.98025	.81633	4.44468
26	542	.26300	242	.59611	949	.98733	662	.45317
27	571	.26814	271	.60211	978	.99443	691	.46169
28	599	.27330	299	.60813	.80006	4.00155	719	.47023
29	627	.27847	328	.61417	035	.00869	748	.47881
30	.76655	3.28366	.78356	3.62023	.80063	4.01585	.81776	4.48740
31	684	.28885	384	.62630	092	.02303	805	.49603
32	712	.29406	413	.63238	120	.03024	834	.50468
33	740	.29929	441	.63849	149	.03746	862	.51337
34	769	.30452	470	.64461	177	.04471	891	.52208
35	.76797	3.30977	.78498	3.65074	.80206	4.05197	.81919	4.53081
36	825	.31503	526	.65690	234	.05926	948	.53958
37	854	.32031	555	.66307	263	.06657	977	.54837
38	882	.32560	583	.66925	291	.07390	.82005	.55720
39	910	.33090	612	.67545	320	.08125	034	.56605
40	.76938	3.33622	.78640	3.68167	.80348	4.08863	.82063	4.57493
41	967	.34154	669	.68791	377	.09602	091	.58383
42	995	.34689	697	.69417	405	.10344	120	.59277
43	.77023	.35224	725	.70044	434	.11088	148	.60174
44	052	.35761	754	.70673	462	.11835	177	.61073
45	.77080	3.36299	.78782	3.71303	.80491	4.12583	.82206	4.61976
46	108	.36839	811	.71935	519	.13334	234	.62881
47	137	.37380	839	.72569	548	.14087	263	.63790
48	165	.37923	868	.73205	577	.14842	292	.64701
49	193	.38466	896	.73843	605	.15599	320	.65616
50	.77222	3.39012	.78924	3.74482	.80634	4.16359	.82349	4.66533
51	250	.39558	953	.75123	662	.17121	377	.67454
52	278	.40106	981	.75766	691	.17886	406	.68377
53	307	.40656	.79010	.76411	719	.18652	435	.69304
54	335	.41206	038	.77057	748	.19421	463	.70234
55	.77363	3.41759	.79067	3.77705	.80776	4.20193	.82492	4.71166
56	392	.42312	095	.78355	805	.20966	521	.72102
57	420	.42867	123	.79007	833	.21742	549	.73041
58	448	.43424	152	.79661	862	.22521	578	.73983
59	477	.43982	180	.80316	891	.23301	607	.74929
60	.77505	3.44541	.79209	3.80973	.80919	4.24084	.82635	4.75877

80°		81°		82°		83°		M.
Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
.82635	4.75877	.84357	5.39245	.86083	6.18530	.87813	7.20551	0
664	.76829	385	.40422	111	.20020	842	.22500	1
692	.77783	414	.41602	140	.21517	871	.24457	2
721	.78742	443	.42787	169	.23019	900	.26425	3
750	.79703	471	.43977	198	.24529	929	.28402	4
.82778	4.80667	.84500	5.45171	.86227	6.26044	.87957	7.30388	5
807	.81635	529	.46369	256	.27566	986	.32384	6
836	.82606	558	.47572	284	.29095	.88015	.34390	7
864	.83581	586	.48779	313	.30630	044	.36405	8
893	.84558	615	.49991	342	.32171	073	.38431	9
.82922	4.85539	.84644	5.51208	.86371	6.33719	.88102	7.40466	10
950	.86524	673	.52429	400	.35274	131	.42511	11
979	.87511	701	.53655	428	.36835	160	.44566	12
.83008	.88502	730	.54886	457	.38403	188	.46632	13
036	.89497	759	.56121	486	.39978	217	.48707	14
.83065	4.90495	.84788	5.57361	.86515	6.41560	.88246	7.50793	15
094	.91496	816	.58606	544	.43148	275	.52889	16
122	.92501	845	.59855	573	.44743	304	.54996	17
151	.93509	874	.61110	601	.46346	333	.57113	18
180	.94521	903	.62369	630	.47955	362	.59241	19
.83208	4.95536	.84931	5.63633	.86659	6.49571	.88391	7.61379	20
237	.96555	960	.64902	688	.51194	420	.63528	21
266	.97577	989	.66176	717	.52825	448	.65688	22
294	.98603	.85018	.67454	746	.54462	477	.67859	23
323	.99633	046	.68738	774	.56107	506	.70041	24
.83352	5.00666	.85075	5.70027	.86803	6.57759	.88535	7.72234	25
380	.01702	104	.71321	832	.59418	564	.74438	26
409	.02743	133	.72620	861	.61085	593	.76653	27
438	.03787	162	.73924	890	.62759	622	.78880	28
467	.04834	190	.75233	919	.64441	651	.81118	29
.83495	5.05886	.85219	5.76547	.86947	6.66130	.88680	7.83367	30
524	.06941	248	.77866	976	.67826	709	.85628	31
553	.08000	277	.79191	.87005	.69530	737	.87901	32
581	.09062	305	.80521	034	.71242	766	.90186	33
610	.10129	334	.81856	063	.72962	795	.92482	34
.83639	5.11199	.85363	5.83196	.87092	6.74689	.88824	7.94791	35
667	.12273	392	.84542	120	.76424	853	.97111	36
696	.13350	420	.85893	149	.78167	882	.99444	37
725	.14432	449	.87250	178	.79918	911	8.01788	38
754	.15517	478	.88612	207	.81677	940	.04146	39
.83782	5.16607	.85507	5.89979	.87236	6.83443	.88969	8.06515	40
811	.17700	536	.91352	265	.85218	998	.08897	41
840	.18797	564	.92731	294	.87001	.89027	.11292	42
868	.19898	593	.94115	322	.88792	055	.13699	43
897	.21004	622	.95505	351	.90592	084	.16120	44
.83926	5.22113	.85651	5.96900	.87380	6.92399	.89113	8.18553	45
954	.23226	680	.98301	409	.94216	142	.20999	46
983	.24343	708	.99708	438	.96040	171	.23459	47
.84012	.25464	737	6.01120	467	.97873	200	.25931	48
041	.26590	766	.02538	496	.99714	229	.28417	49
.84069	5.27719	.85795	6.03962	.87524	7.01565	.89258	8.30917	50
098	.28853	823	.05392	553	.03423	287	.33430	51
127	.29991	852	.06828	582	.05291	316	.35957	52
155	.31133	881	.08269	611	.07167	345	.38497	53
184	.32279	910	.09717	640	.09052	374	.41052	54
.84213	5.33429	.85939	6.11171	.87669	7.10946	.89403	8.43620	55
242	.34584	967	.12630	698	.12849	431	.46203	56
270	.35743	996	.14096	726	.14760	460	.48800	57
299	.36906	.86025	.15568	755	.16681	489	.51411	58
328	.38073	054	.17046	784	.18612	518	.54037	59
.84357	5.39245	.86083	6.18530	.87813	7.20551	.89547	8.56677	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANT

M.	84°		85°		86°		M
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.89547	8.56677	.91284	10.47371	.93024	13.33559	0
1	576	.59332	313	.51199	053	.39547	1
2	605	.62002	342	.55052	082	.45586	2
3	634	.64687	371	.58932	111	.51676	3
4	663	.67387	400	.62837	140	.57817	4
5	.89692	8.70103	.91429	10.66769	.93169	13.64011	5
6	721	.72833	458	.70728	198	.70258	6
7	750	.75579	487	.74714	227	.76558	7
8	779	.78341	516	.78727	257	.82913	8
9	808	.81119	545	.82768	286	.89323	9
10	.89836	8.83912	.91574	10.86837	.93315	13.95788	10
11	865	.86722	603	.90934	344	14.02310	11
12	894	.89547	632	.95060	373	.08890	12
13	923	.92389	661	.99214	402	.15527	13
14	952	.95248	690	11.03397	431	.22223	14
15	.89981	8.98123	.91719	11.07610	.93460	14.28979	15
16	.90010	9.01015	748	.11852	489	.35795	16
17	039	.03923	777	.16125	518	.42672	17
18	068	.06849	806	.20427	547	.49611	18
19	097	.09792	835	.24761	576	.56613	19
20	.90126	9.12752	.91864	11.29125	.93605	14.63679	20
21	155	.15730	893	.33521	634	.70810	21
22	184	.18725	922	.37948	663	.78005	22
23	213	.21739	951	.42408	692	.85268	23
24	242	.24770	980	.46900	721	.92597	24
25	.90271	9.27819	.92009	11.51424	.93750	14.99995	25
26	300	.30887	038	.55981	779	15.07462	26
27	329	.33973	067	.60572	808	.14999	27
28	358	.37077	096	.65197	837	.22607	28
29	386	.40201	125	.69856	866	.30287	29
30	.90415	9.43343	.92154	11.74549	.93895	15.38041	30
31	444	.46505	183	.79278	924	.45869	31
32	473	.49685	212	.84042	953	.53772	32
33	502	.52886	241	.88841	982	.61751	33
34	531	.56106	270	.93677	.94011	.69808	34
35	.90560	9.59346	.92299	11.98549	.94040	15.77944	35
36	589	.62605	328	12.03458	069	.86159	36
37	618	.65885	357	.08404	098	.94456	37
38	647	.69186	386	.13388	127	16.02835	38
39	676	.72507	415	.18411	156	.11297	39
40	.90705	9.75849	.92444	12.23472	.94186	16.19843	40
41	734	.79212	473	.28572	215	.28476	41
42	763	.82596	502	.33712	244	.37196	42
43	792	.86001	531	.38891	273	.46005	43
44	821	.89428	560	.44112	302	.54903	44
45	.90850	9.92877	.92589	12.49373	.94331	16.63893	45
46	879	.96348	618	.54676	360	.72975	46
47	908	.99841	647	.60021	389	.82152	47
48	937	10.03356	676	.65408	418	.91424	48
49	966	.06894	705	.70838	447	17.00794	49
50	.90995	10.10455	.92734	12.76311	.94476	17.10262	50
51	.91024	.14039	763	.81829	505	.19830	51
52	053	.17646	792	.87391	534	.29500	52
53	082	.21277	821	.92999	563	.39274	53
54	111	.24932	850	.98651	592	.49153	54
55	.91140	10.28610	.92879	13.04350	.94621	17.59139	55
56	169	.32313	908	.10096	650	.69233	56
57	197	.36040	937	.15889	679	.79438	57
58	226	.39792	966	.21730	708	.89755	58
59	255	.43569	995	.27620	737	18.00185	59
60	.91284	10.47371	.93024	13.33559	.94766	18.10732	60

TABLE XIX.—NATURAL VERSED SINES AND EXTERNAL SECANTS

M.	87°		88°		89°		M.
	Vers.	Exsec.	Vers.	Exsec.	Vers.	Exsec.	
0	.94766	18.10732	.96510	27.65371	.98255	56.29869	0
1	795	.21397	539	.89440	284	57.26975	1
2	825	.32182	568	28.13917	313	58.27431	2
3	854	.43088	597	.38812	342	59.31411	3
4	883	.54119	626	.64137	371	60.39105	4
5	.94912	18.65275	.96655	28.89903	.98400	61.50715	5
6	941	.76560	684	29.16120	429	62.66460	6
7	970	.87976	714	.42802	458	63.86572	7
8	999	.99524	743	.69960	487	65.11304	8
9	.95028	19.11207	772	.97607	517	66.40927	9
10	.95057	19.23028	.96801	30.25758	.98546	67.75736	10
11	086	.34989	830	.54425	575	69.16047	11
12	115	.47093	859	.83623	604	70.62205	12
13	144	.59341	888	31.13366	633	72.14583	13
14	173	.71737	917	.43671	662	73.73586	14
15	.95202	19.84283	.96946	31.74554	.98691	75.39655	15
16	231	.96982	975	32.06030	720	77.13274	16
17	260	20.09838	.97004	.38118	749	78.94968	17
18	289	.22852	033	.70835	778	80.85315	18
19	318	.36027	062	33.04199	807	82.84947	19
20	.95347	20.49368	.97092	33.38232	.98836	84.94561	20
21	377	.62876	121	.72951	866	87.14924	21
22	406	.76555	150	34.08380	895	89.46886	22
23	435	.90409	179	.44539	924	91.91387	23
24	464	21.04440	208	.81452	953	94.49471	24
25	.95493	21.18653	.97237	35.19141	.98982	97.22303	25
26	522	.33050	266	.57633	.99011	100.11185	26
27	551	.47635	295	.96953	040	103.17574	27
28	580	.62413	324	36.37127	069	106.43114	28
29	609	.77386	353	.78185	098	109.89656	29
30	.95638	21.92559	.97382	37.20155	.99127	113.59301	30
31	667	22.07935	411	.63068	156	117.54440	31
32	696	.23520	440	38.06957	186	121.77803	32
33	725	.39316	470	.51855	215	126.32526	33
34	754	.55329	499	.97797	244	131.22229	34
35	.95783	22.71563	.97528	39.44820	.99273	136.51108	35
36	812	.88022	557	.92963	302	142.24061	36
37	841	23.04712	586	40.42266	331	148.46837	37
38	871	.21637	615	.92772	360	155.26228	
39	900	.38802	644	41.44525	389	162.70325	
40	.95929	23.56212	.97673	41.97571	.99418	170.88831	
41	958	.73873	702	42.51961	447	179.93496	
42	987	.91790	731	43.07746	476	189.98680	
43	.96016	24.09969	760	.64980	505	201.22122	
44	045	.28414	789	44.23719	535	213.85995	
45	.96074	24.47134	.97819	44.84026	.99564	228.18385	
46	103	.66132	848	45.45963	593	244.55402	
47	132	.85417	877	46.09596	622	263.44269	
48	161	25.04994	906	.74997	651	285.47948	
49	190	.24869	935	47.42241	680	311.52297	
50	.96219	25.45051	.97964	48.11406	.99709	342.77516	
51	248	.65545	993	.82576	738	380.97230	
52	277	.86360	.98022	49.55840	767	428.71873	
53	307	26.07503	051	50.31290	796	490.10702	
54	336	.28981	080	51.09027	825	571.95809	
55	.96365	26.50804	.98109	51.89156	.99855	686.54960	
56	394	.72978	138	52.71790	884	858.43689	
57	423	.95512	168	53.57046	913	1144.91574	
58	452	27.18417	197	54.45053	942	1717.87348	
59	481	.41700	226	55.35946	971	3436.74682	
60	.96510	27.65371	.98255	56.29869	1.00000	∞	

TABLE XX.—LENGTHS OF CIRCULAR ARCS; RADIUS = 1.

Sec.	Length.	Min.	Length.	Deg.	Length.	Deg.	Length.
1	.0000048	1	.0002909	1	.0174533	61	1.064650
2	00097	2	05818	2	.0349066	62	.082104
3	00145	3	08727	3	.0523599	63	.099557
4	00194	4	11636	4	.0698132	64	.117010
5	.0000242	5	.0014544	5	.0872665	65	1.134464
6	00291	6	17453	6	.1047198	66	.151917
7	00339	7	20362	7	.1221730	67	.169370
8	00388	8	23271	8	.1396263	68	.186823
9	00436	9	26180	9	.1570796	69	.204277
10	.0000485	10	.0029089	10	.1745329	70	1.221730
11	00533	11	31998	11	.1919862	71	.239183
12	00582	12	34907	12	.2094395	72	.256637
13	00630	13	37815	13	.2268928	73	.274090
14	00679	14	40724	14	.2443461	74	.291543
15	.0000727	15	.0043633	15	.2617994	75	1.308996
16	00776	16	46542	16	.2792527	76	.326450
17	00824	17	49451	17	.2967060	77	.343903
18	00873	18	52360	18	.3141593	78	.361356
19	00921	19	55269	19	.3316126	79	.378810
20	.0000970	20	.0058178	20	.3490659	80	1.396263
21	01018	21	61087	21	.3665191	81	.413716
22	01067	22	63995	22	.3839724	82	.431170
23	01115	23	66904	23	.4014257	83	.448623
24	01164	24	69813	24	.4188790	84	.466076
25	.0001212	25	.0072722	25	.4363323	85	1.483529
26	01261	26	75631	26	.4537856	86	.500983
27	01309	27	78540	27	.4712389	87	.518436
28	01357	28	81449	28	.4886922	88	.535889
29	01406	29	84358	29	.5061455	89	.553343
30	.0001454	30	.0087266	30	.5235988	90	1.570796
31	01503	31	90175	31	.5410521	91	.588249
32	01551	32	93084	32	.5585054	92	.605702
33	01600	33	95993	33	.5759587	93	.623156
34	01648	34	98902	34	.5934119	94	.640609
35	.0001697	35	.0101811	35	.6108652	95	1.658062
36	01745	36	04720	36	.6283185	96	.675516
37	01794	37	07629	37	.6457718	97	.692969
38	01842	38	10538	38	.6632251	98	.710422
39	01891	39	13446	39	.6806784	99	.727876
40	.0001939	40	.0116355	40	.6981317	100	1.745329
41	01988	41	19264	41	.7155850	101	.762782
42	02036	42	22173	42	.7330383	102	.780235
43	02085	43	25082	43	.7504916	103	.797689
44	02133	44	27991	44	.7679449	104	.815142
45	.0002182	45	.0130900	45	.7853982	105	1.832595
46	02230	46	33809	46	.8028515	106	.850049
47	02279	47	36717	47	.8203047	107	.867502
48	02327	48	39626	48	.8377580	108	.884955
49	02376	49	42535	49	.8552113	109	.902408
50	.0002424	50	.0145444	50	.8726646	110	1.919862
51	02473	51	48353	51	.8901179	111	.937315
52	02521	52	51262	52	.9075712	112	.954768
53	02570	53	54171	53	.9250245	113	.972222
54	02618	54	57080	54	.9424778	114	.989675
55	.0002666	55	.0159989	55	.9599311	115	2.007128
56	02715	56	62897	56	.9773844	116	.024581
57	02763	57	65806	57	.9948377	117	.042035
58	02812	58	68715	58	1.0122910	118	.059488
59	02860	59	71624	59	1.0297443	119	.076941
60	.0002909	60	.0174533	60	1.0471976	120	2.094395

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
1	1	1	1.0000000	1.0000000	1.000000000	1
2	4	8	.4142136	.2599210	.500000000	2
3	9	27	.7320508	.4422496	.333333333	3
4	16	64	2.0000000	.5874011	.250000000	4
5	25	125	2.2360680	1.7099759	.200000000	5
6	36	216	.4494897	.8171206	.166666667	6
7	49	343	.6457513	.9129312	.142857143	7
8	64	512	.8284271	2.0000000	.125000000	8
9	81	729	3.0000000	.0800837	.111111111	9
10	100	1000	3.1622777	2.1544347	.100000000	10
11	121	1331	.3166248	.2239801	.090909091	11
12	144	1728	.4641016	.2894286	.083333333	12
13	169	2197	.6055513	.3513347	.076923077	13
14	196	2744	.7416574	.4101422	1428571	14
15	225	3375	3.8729833	2.4662121	.066666667	15
16	256	4096	4.0000000	.5198421	2500000	16
17	289	4913	.1231056	.5712816	.058823529	17
18	324	5832	.2426407	.6207414	5555556	18
19	361	6859	.3588989	.6684016	2631579	19
20	400	8000	4.4721360	2.7144177	.050000000	20
21	441	9261	.5825757	.7589243	.047619048	21
22	484	10648	.6904158	.8020393	5454545	22
23	529	12167	.7958315	.8438670	3478261	23
24	576	13824	.8989795	.8844991	1666667	24
25	625	15625	5.0000000	2.9240177	.040000000	25
26	676	17576	.0990195	.9624960	.038461538	26
27	729	19683	.1961524	3.0000000	7037037	27
28	784	21952	.2915026	.0365889	5714286	28
29	841	24389	.3851648	.0723168	4482759	29
30	900	27000	5.4772256	3.1072325	.033333333	30
31	961	29791	.5677644	.1413806	2258065	31
32	1024	32768	.6568542	.1748021	1250000	32
33	1089	35937	.7445626	.2075343	0303030	33
34	1156	39304	.8309519	.2396118	.029411765	34
35	1225	42875	5.9160798	3.2710663	.028571429	35
36	1296	46656	6.0000000	.3019272	7777778	36
37	1369	50653	.0827625	.3322218	7027027	37
38	1444	54872	.1644140	.3619754	6315789	38
39	1521	59319	.2449980	.3912114	5641026	39
40	1600	64000	6.3245553	3.4199519	.025000000	40
41	1681	68921	.4031242	.4482172	4390244	41
42	1764	74088	.4807407	.4760266	3809524	42
43	1849	79507	.5574385	.5033981	3255814	43
44	1936	85184	.6332496	.5303483	2727273	44
45	2025	91125	6.7082039	3.5568933	.022222222	45
46	2116	97336	.7823300	.5830479	1739130	46
47	2209	103823	.8556546	.6088261	1276600	47
48	2304	110592	.9282032	.6342411	0833333	48
49	2401	117649	7.0000000	.6593057	0408163	49
50	2500	125000	7.0710678	3.6840314	.020000000	50
51	2601	132651	.1414284	.7084298	.019607843	51
52	2704	140608	.2111026	.7325111	9230769	52
53	2809	148877	.2801099	.7562858	8867925	53
54	2916	157464	.3484692	.7797631	8518519	54
55	3025	166375	7.4161985	3.8029525	.018181818	55
56	3136	175616	.4833148	.8258624	7857143	56
57	3249	185193	.5498344	.8485011	7543860	57
58	3364	195112	.6157731	.8708766	7241379	58
59	3481	205379	.6811457	.8929965	6949153	59

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
60	3600	216000	7.7459667	3.9148676	.016666667	60
61	3721	226981	.8102497	.9364972	6393443	61
62	3844	238328	.8740079	.9578915	6129032	62
63	3969	250047	.9372539	.9790571	5873016	63
64	4096	262144	8.0000000	4.0000000	5625000	64
65	4225	274625	8.0622577	4.0207256	.015384615	65
66	4356	287496	.1240384	.0412401	5151515	66
67	4489	300763	.1853528	.0615480	4925373	67
68	4624	314432	.2462113	.0816551	4705882	68
69	4761	328509	.3066239	.1015661	4492754	69
70	4900	343000	8.3666003	4.1212853	.014285714	70
71	5041	357911	.4261498	.1408178	4084507	71
72	5184	373248	.4852814	.1601676	3888889	72
73	5329	389017	.5440037	.1793392	3698630	73
74	5476	405224	.6023253	.1983364	3513514	74
75	5625	421875	8.6602540	4.2171633	.013333333	75
76	5776	438976	.7177979	.2358236	3157895	76
77	5929	456533	.7749644	.2543210	2987013	77
78	6084	474552	.8317609	.2726586	2820513	78
79	6241	493039	.8881944	.2908404	2658228	79
80	6400	512000	8.9442719	4.3088695	.012500000	80
81	6561	531441	9.0000000	.3267487	2345679	81
82	6724	551368	.0553851	.3444815	2195122	82
83	6889	571787	.1104336	.3620707	2048193	83
84	7056	592704	.1651514	.3795191	1904762	84
85	7225	614125	9.2195445	4.3968296	.011764706	85
86	7396	636056	.2736185	.4140049	1627907	86
87	7569	658503	.3273791	.4310476	1494253	87
88	7744	681472	.3808315	.4479602	1363636	88
89	7921	704969	.4339811	.4647451	1235955	89
90	8100	729000	9.4868330	4.4814047	.011111111	90
91	8281	753571	.5393920	.4979414	0989011	91
92	8464	778688	.5916630	.5143574	0869565	92
93	8649	804357	.6436508	.5306549	0752688	93
94	8836	830584	.6953597	.5468359	0638298	94
95	9025	857375	9.7467943	4.5629026	.010526316	95
96	9216	884736	.7979590	.5788570	0416667	96
97	9409	912673	.8488578	.5947009	0309278	97
98	9604	941192	.8994949	.6104363	0204082	98
99	9801	970299	.9498744	.6260650	0101010	99
100	10000	1000000	10.0000000	4.6415888	.010000000	100
101	10201	1030301	.0498756	.6570095	.009900990	101
102	10404	1061208	.0995049	.6723287	9803922	102
103	10609	1092727	.1488916	.6875482	9708738	103
104	10816	1124864	.1980390	.7026694	9615385	104
105	11025	1157625	10.2469508	4.7176940	.009523810	105
106	11236	1191016	.2956301	.7326235	9433962	106
107	11449	1225043	.3440804	.7474594	9345794	107
108	11664	1259712	.3923048	.7622032	9259259	108
109	11881	1295029	.4403065	.7768562	9174312	109
110	12100	1331000	10.4880885	4.7914199	.009090909	110
111	12321	1367631	.5356538	.8058955	9009009	111
112	12544	1404928	.5830052	.8202845	8928571	112
113	12769	1442897	.6301458	.8345881	8849558	113
114	12996	1481544	.6770783	.8488076	8771930	114
115	13225	1520875	10.7238053	4.8629442	.008695652	115
116	13456	1560896	.7703296	.8769990	8620690	116
117	13689	1601613	.8166538	.8909732	8547009	117
118	13924	1643032	.8627805	.9048681	8474576	118
119	14161	1685159	.9087121	.9186847	8403361	119

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
120	14400	1728000	10.9544512	4.9324242	.008333333	120
121	14641	1771561	11.0000000	.9460874	8264463	121
122	14884	1815848	.0453610	.9596757	8196721	122
123	15129	1860867	.0905365	.9731898	8130081	123
124	15376	1906624	.1355287	.9866310	8064516	124
125	15625	1953125	11.1803399	5.0000000	.008000000	125
126	15876	2000376	.2249722	.0132979	7936508	126
127	16129	2048383	.2694277	.0265257	7874016	127
128	16384	2097152	.3137085	.0396842	7812500	128
129	16641	2146689	.3578167	.0527743	7751938	129
130	16900	2197000	11.4017543	5.0657970	.007692308	130
131	17161	2248091	.4455231	.0787531	7633588	131
132	17424	2299968	.4891253	.0916434	7575758	132
133	17689	2352637	.5325626	.1044687	7518797	133
134	17956	2406104	.5758369	.1172299	7462687	134
135	18225	2460375	11.6189500	5.1299278	.007407407	135
136	18496	2515456	.6619038	.1425632	7352941	136
137	18769	2571353	.7046999	.1551367	7299270	137
138	19044	2628072	.7473401	.1676493	7246377	138
139	19321	2685619	.7898261	.1801015	7194245	139
140	19600	2744000	11.8321596	5.1924941	.007142857	140
141	19881	2803221	.8743421	.2048279	7092199	141
142	20164	2863288	.9163753	.2171034	7042254	142
143	20449	2924207	.9582607	.2293215	6993007	143
144	20736	2985984	12.0000000	.2414828	6944444	144
145	21025	3048625	12.0415946	5.2535879	.006896552	145
146	21316	3112136	.0830460	.2656374	6849315	146
147	21609	3176523	.1243557	.2776321	6802721	147
148	21904	3241792	.1655251	.2895725	6756757	148
149	22201	3307949	.2065556	.3014592	6711409	149
150	22500	3375000	12.2474487	5.3132928	.006666667	150
151	22801	3442951	.2882057	.3250740	6622517	151
152	23104	3511808	.3288280	.3368033	6578947	152
153	23409	3581577	.3693169	.3484812	6535948	153
154	23716	3652264	.4096736	.3601084	6493506	154
155	24025	3723875	12.4498996	5.3716854	.006451613	155
156	24336	3796416	.4899960	.3832126	6410256	156
157	24649	3869893	.5299641	.3946907	6369427	157
158	24964	3944312	.5698051	.4061202	6329114	158
159	25281	4019679	.6095202	.4175015	6289308	159
160	25600	4096000	12.6491106	5.4288352	.006250000	160
161	25921	4173281	.6885775	.4401218	6211180	161
162	26244	4251528	.7279221	.4513618	6172840	162
163	26569	4330747	.7671453	.4625556	6134969	163
164	26896	4410944	.8062485	.4737037	6097561	164
165	27225	4492125	12.8452326	5.4848066	.006060606	165
166	27556	4574296	.8840987	.4958647	6024096	166
167	27889	4657463	.9228480	.5068784	5988024	167
168	28224	4741632	.9614814	.5178484	5952381	168
169	28561	4826809	13.0000000	.5287748	5917160	169
170	28900	4913000	13.0384048	5.5396583	.005882353	170
171	29241	5000211	.0766968	.5504991	5847953	171
172	29584	5088448	.1148770	.5612978	5813953	172
173	29929	5177717	.1529464	.5720546	5780347	173
174	30276	5268024	.1909060	.5827702	5747126	174
175	30625	5359375	13.2287566	5.5934447	.005714286	175
176	30976	5451776	.2664992	.6040787	5681818	176
177	31329	5545233	.3041347	.6146724	5649718	177
178	31684	5639752	.3416641	.6252263	5617978	178
179	32041	5735339	.3790882	.6357408	5586592	179

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
180	32400	5832000	13.4164079	5.6462162	.005555556
181	32761	5929741	.4536240	.6566528	5524862
182	33124	6028568	.4907376	.6670511	5494505
183	33489	6128487	.5277493	.6774114	5464481
184	33856	6229504	.5646600	.6877340	5434783
185	34225	6331625	13.6014705	5.6980192	.005405405
186	34596	6434856	.6381817	.7082675	5376344
187	34969	6539203	.6747943	.7184791	5347594
188	35344	6644672	.7113092	.7286543	5319149
189	35721	6751269	.7477271	.7387936	5291005
190	36100	6859000	13.7840488	5.7488971	.005263158
191	36481	6967871	.8202750	.7589652	5235602
192	36864	7077888	.8564065	.7689982	5208333
193	37249	7189057	.8924440	.7789966	5181347
194	37636	7301384	.9283883	.7889604	5154639
195	38025	7414875	13.9642400	5.7988900	.005128205
196	38416	7529536	14.0000000	.8087857	5102041
197	38809	7645373	.0356688	.8186479	5076142
198	39204	7762392	.0712473	.8284767	5050505
199	39601	7880599	.1067360	.8382725	5025126
200	40000	8000000	14.1421356	5.8480355	.005000000
201	40401	8120601	.1774469	.8577660	4975124
202	40804	8242408	.2126704	.8674643	4950495
203	41209	8365427	.2478068	.8771307	4926108
204	41616	8489664	.2828569	.8867653	4901961
205	42025	8615125	14.3178211	5.8963685	.004878049
206	42436	8741816	.3527001	.9059406	4854369
207	42849	8869743	.3874946	.9154817	4830918
208	43264	8998912	.4222051	.9249921	4807692
209	43681	9129329	.4568323	.9344721	4784689
210	44100	9261000	14.4913767	5.9439220	.004761905
211	44521	9393931	.5258390	.9533418	4739336
212	44944	9528128	.5602198	.9627320	4716981
213	45369	9663597	.5945195	.9720926	4694836
214	45796	9800344	.6287388	.9814240	4672897
215	46225	9938375	14.6628783	5.9907264	.004651163
216	46656	10077696	.6969385	6.0000000	4629630
217	47089	10218313	.7309199	.0092450	4608295
218	47524	10360232	.7648231	.0184617	4587156
219	47961	10503459	.7986486	.0276502	4566210
220	48400	10648000	14.8323970	6.0368107	.004545455
221	48841	10793861	.8660687	.0459435	4524887
222	49284	10941048	.8996644	.0550489	4504505
223	49729	11089567	.9331845	.0641270	4484305
224	50176	11239424	.9666295	.0731779	4464286
225	50625	11390625	15.0000000	6.0822020	.004444444
226	51076	11543176	.0332964	.0911994	4424779
227	51529	11697083	.0665192	.1001702	4405286
228	51984	11852352	.0996689	.1091147	4385965
229	52441	12008989	.1327460	.1180332	4366812
230	52900	12167000	15.1657509	6.1269257	.004347826
231	53361	12326391	.1986842	.1357924	4329004
232	53824	12487168	.2315462	.1446337	4310345
233	54289	12649337	.2643375	.1534495	4291845
234	54756	12812904	.2970585	.1622401	4273504
235	55225	12977875	15.3297097	6.1710058	.004255319
236	55696	13144256	.3622915	.1797466	4237288
237	56169	13312053	.3948043	.1884628	4219409
238	56644	13481272	.4272486	.1971544	4201681
239	57121	13651919	.4596248	.2058218	4184100

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
240	57600	13824000	15.4919334	6.2144650	.004166667	**240**
241	58081	13997521	.5241747	.2230843	4149378	**241**
242	58564	14172488	.5563492	.2316797	4132231	**242**
243	59049	14348907	.5884573	.2402515	4115226	**243**
244	59536	14526784	.6204994	.2487998	4098361	**244**
245	60025	14706125	15.6524758	6.2573248	.004081633	**245**
246	60516	14886936	.6843871	.2658266	4065041	**246**
247	61009	15069223	.7162336	.2743054	4048583	**247**
248	61504	15252992	.7480157	.2827613	4032258	**248**
249	62001	15438249	.7797338	.2911946	4016064	**249**
250	62500	15625000	15.8113883	6.2996053	.004000000	**250**
251	63001	15813251	.8429795	.3079935	3984064	**251**
252	63504	16003008	.8745079	.3163596	3968254	**252**
253	64009	16194277	.9059737	.3247035	3952569	**253**
254	64516	16387064	.9373775	.3330256	3937008	**254**
255	65025	16581375	15.9687194	6.3413257	.003921569	**255**
256	65536	16777216	16.0000000	.3496042	3906250	**256**
257	66049	16974593	.0312195	.3578611	3891051	**257**
258	66564	17173512	.0623784	.3660968	3875969	**258**
259	67081	17373979	.0934769	.3743111	3861004	**259**
260	67600	17576000	16.1245155	6.3825043	.003846154	**260**
261	68121	17779581	.1554944	.3906765	3831418	**261**
262	68644	17984728	.1864141	.3988279	3816794	**262**
263	69169	18191447	.2172747	.4069585	3802281	**263**
264	69696	18399744	.2480768	.4150687	3787879	**264**
265	70225	18609625	16.2788206	6.4231583	.003773585	**265**
266	70756	18821096	.3095064	.4312276	3759398	**266**
267	71289	19034163	.3401346	.4392767	3745318	**267**
268	71824	19248832	.3707055	.4473057	3731343	**268**
269	72361	19465109	.4012195	.4553148	3717472	**269**
270	72900	19683000	16.4316767	6.4633041	.003703704	**270**
271	73441	19902511	.4620776	.4712736	3690037	**271**
272	73984	20123648	.4924225	.4792236	3676471	**272**
273	74529	20346417	.5227116	.4871541	3663004	**273**
274	75076	20570824	.5529454	.4950653	3649635	**274**
275	75625	20796875	16.5831240	6.5029572	.003636364	**275**
276	76176	21024576	.6132477	.5108300	3623188	**276**
277	76729	21253933	.6433170	.5186839	3610108	**277**
278	77284	21484952	.6733320	.5265189	3597122	**278**
279	77841	21717639	.7032931	.5343351	3584229	**279**
280	78400	21952000	16.7332005	6.5421326	.003571429	**280**
281	78961	22188041	.7630546	.5499116	3558719	**281**
282	79524	22425768	.7928556	.5576722	3546099	**282**
283	80089	22665187	.8226038	.5654144	3533569	**283**
284	80656	22906304	.8522995	.5731385	3521127	**284**
285	81225	23149125	16.8819430	6.5808443	.003508772	**285**
286	81796	23393656	.9115345	.5885323	3496503	**286**
287	82369	23639903	.9410743	.5962023	3484321	**287**
288	82944	23887872	.9705627	.6038545	3472222	**288**
289	83521	24137569	17.0000000	.6114890	3460208	**289**
290	84100	24389000	17.0293864	6.6191060	.003448276	**290**
291	84681	24642171	.0587221	.6267054	3436426	**291**
292	85264	24897088	.0880075	.6342874	3424658	**292**
293	85849	25153757	.1172428	.6418522	3412969	**293**
294	86436	25412184	.1464282	.6493998	3401361	**294**
295	87025	25672375	17.1755640	6.6569302	.003389831	**295**
296	87616	25934336	.2046505	.6644437	3378378	**296**
297	88209	26198073	.2336879	.6719403	3367003	**297**
298	88804	26463592	.2626765	.6794200	3355705	**298**
299	89401	26730899	.2916165	.6868831	3344482	**299**

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
300	90000	27000000	17.3205081	6.6943295	.003333333	300
301	90601	27270901	.3493516	.7017593	3322259	301
302	91204	27543608	.3781472	.7091729	3311258	302
303	91809	27818127	.4068952	.7165700	3300330	303
304	92416	28094464	.4355958	.7239508	3289474	304
305	93025	28372625	17.4642492	6.7313155	.003278689	305
306	93636	28652616	.4928557	.7386641	3267974	306
307	94249	28934443	.5214155	.7459967	3257329	307
308	94864	29218112	.5499288	.7533134	3246753	308
309	95481	29503629	.5783958	.7606143	3236246	309
310	96100	29791000	17.6068169	6.7678995	.003225806	310
311	96721	30080231	.6351921	.7751690	3215434	311
312	97344	30371328	.6635217	.7824229	3205128	312
313	97969	30664297	.6918060	.7896613	3194888	313
314	98596	30959144	.7200451	.7968844	3184713	314
315	99225	31255875	17.7482393	6.8040921	.003174603	315
316	99856	31554496	.7763888	.8112847	3164557	316
317	100489	31855013	.8044938	.8184620	3154574	317
318	101124	32157432	.8325545	.8256242	3144654	318
319	101761	32461759	.8605711	.8327714	3134796	319
320	102400	32768000	17.8885438	6.8399037	.003125000	320
321	103041	33076161	.9164729	.8470213	3115265	321
322	103684	33386248	.9443584	.8541240	3105590	322
323	104329	33698267	.9722008	.8612120	3095975	323
324	104976	34012224	18.0000000	.8682855	3086420	324
325	105625	34328125	18.0277564	6.8753443	.003076923	325
326	106276	34645976	.0554701	.8823888	3067485	326
327	106929	34965783	.0831413	.8894188	3058104	327
328	107584	35287552	.1107703	.8964345	3048780	328
329	108241	35611289	.1383571	.9034359	3039514	329
330	108900	35937000	18.1659021	6.9104232	.003030303	330
331	109561	36264691	.1934054	.9173964	3021148	331
332	110224	36594368	.2208672	.9243556	3012048	332
333	110889	36926037	.2482876	.9313008	3003003	333
334	111556	37259704	.2756669	.9382321	2994012	334
335	112225	37595375	18.3030052	6.9451496	.002985075	335
336	112896	37933056	.3303028	.9520533	2976190	336
337	113569	38272753	.3575598	.9589434	2967359	337
338	114244	38614472	.3847763	.9658198	2958580	338
339	114921	38958219	.4119526	.9726826	2949853	339
340	115600	39304000	18.4390889	6.9795321	.002941176	340
341	116281	39651821	.4661853	.9863681	2932551	341
342	116964	40001688	.4932420	.9931906	2923977	342
343	117649	40353607	.5202592	7.0000000	2915452	343
344	118336	40707584	.5472370	.0067962	2906977	344
345	119025	41063625	18.5741756	7.0135791	.002898551	345
346	119716	41421736	.6010752	.0203490	2890173	346
347	120409	41781923	.6279360	.0271058	2881844	347
348	121104	42144192	.6547581	.0338497	2873563	348
349	121801	42508549	.6815417	.0405806	2865330	349
350	122500	42875000	18.7082869	7.0472987	.002857143	350
351	123201	43243551	.7349940	.0540041	2849003	351
352	123904	43614208	.7616630	.0606967	2840909	352
353	124609	43986977	.7882942	.0673767	2832861	353
354	125316	44361864	.8148877	.0740440	2824859	354
355	126025	44738875	18.8414437	7.0806988	.002816901	355
356	126736	45118016	.8679623	.0873411	2808989	356
357	127449	45499293	.8944436	.0939709	2801120	357
358	128164	45882712	.9208879	.1005885	2793296	358
359	128881	46268279	.9472953	.1071937	2785515	359

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
360	129600	46656000	18.9736660	7.1137866	.002777778	360
361	130321	47045881	19.0000000	.1203674	2770083	361
362	131044	47437928	.0262976	.1269360	2762431	362
363	131769	47832147	.0525589	.1334925	2754821	363
364	132496	48228544	.0787840	.1400370	2747253	364
365	133225	48627125	19.1049732	7.1465695	.002739726	365
366	133956	49027896	.1311265	.1530901	2732240	366
367	134689	49430863	.1572441	.1595988	2724796	367
368	135424	49836032	.1833261	.1660957	2717391	368
369	136161	50243409	.2093727	.1725809	2710027	369
370	136900	50653000	19.2353841	7.1790544	.002702703	370
371	137641	51064811	.2613603	.1855162	2695418	371
372	138384	51478848	.2873015	.1919663	2688172	372
373	139129	51895117	.3132079	.1984050	2680965	373
374	139876	52313624	.3390796	.2048322	2673797	374
375	140625	52734375	19.3649167	7.2112479	.002666667	375
376	141376	53157376	.3907194	.2176522	2659574	376
377	142129	53582633	.4164878	.2240450	2652520	377
378	142884	54010152	.4422221	.2304268	2645503	378
379	143641	54439939	.4679223	.2367972	2638522	379
380	144400	54872000	19.4935887	7.2431565	.002631579	380
381	145161	55306341	.5192213	.2495045	2624672	381
382	145924	55742968	.5448203	.2558415	2617801	382
383	146689	56181887	.5703858	.2621675	2610966	383
384	147456	56623104	.5959179	.2684824	2604167	384
385	148225	57066625	19.6214169	7.2747864	.002597403	385
386	148996	57512456	.6468827	.2810794	2590674	386
387	149769	57960603	.6723156	.2873617	2583979	387
388	150544	58411072	.6977156	.2936330	2577320	388
389	151321	58863869	.7230829	.2998936	2570694	389
390	152100	59319000	19.7484177	7.3061436	.002564103	390
391	152881	59776471	.7737199	.3123828	2557545	391
392	153664	60236288	.7989899	.3186114	2551020	392
393	154449	60698457	.8242276	.3248295	2544529	393
394	155236	61162984	.8494332	.3310369	2538071	394
395	156025	61629875	19.8746069	7.3372339	.002531646	395
396	156816	62099136	.8997487	.3434205	2525253	396
397	157609	62570773	.9248588	.3495966	2518892	397
398	158404	63044792	.9499373	.3557624	2512563	398
399	159201	63521199	.9749844	.3619178	2506266	399
400	160000	64000000	20.0000000	7.3680630	.002500000	400
401	160801	64481201	.0249844	.3741979	2493766	401
402	161604	64964808	.0499377	.3803227	2487562	402
403	162409	65450827	.0748599	.3864373	2481390	403
404	163216	65939264	.0997512	.3925418	2475248	404
405	164025	66430125	20.1246118	7.3986363	.002469136	405
406	164836	66923416	.1494417	.4047206	2463054	406
407	165649	67419143	.1742410	.4107950	2457002	407
408	166464	67917312	.1990099	.4168595	2450980	408
409	167281	68417929	.2237484	.4229142	2444988	409
410	168100	68921000	20.2484567	7.4289589	.002439024	410
411	168921	69426531	.2731349	.4349938	2433090	411
412	169744	69934528	.2977831	.4410189	2427184	412
413	170569	70444997	.3224014	.4470342	2421308	413
414	171396	70957944	.3469899	.4530399	2415459	414
415	172225	71473375	20.3715488	7.4590359	.002409639	415
416	173056	71991296	.3960781	.4650223	2403846	416
417	173889	72511713	.4205779	.4709991	2398082	417
418	174724	73034632	.4450483	.4769664	2392344	418
419	175561	73560059	.4694895	.4829242	2386635	419

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
420	176400	74088000	20.4939015	7.4888724	.002380952	420
421	177241	74618461	.5182845	.4948113	2375297	421
422	178084	75151448	.5426386	.5007406	2369668	422
423	178929	75686967	.5669638	.5066607	2364066	423
424	179776	76225024	.5912603	.5125715	2358491	424
425	180625	76765625	20.6155281	7.5184730	.002352941	425
426	181476	77308776	.6397674	.5243652	2347418	426
427	182329	77854483	.6639783	.5302482	2341920	427
428	183184	78402752	.6881609	.5361221	2336449	428
429	184041	78953589	.7123152	.5419867	2331002	429
430	184900	79507000	20.7364414	7.5478423	.002325581	430
431	185761	80062991	.7605395	.5536888	2320186	431
432	186624	80621568	.7846097	.5595263	2314815	432
433	187489	81182737	.8086520	.5653548	2309469	433
434	188356	81746504	.8326667	.5711743	2304147	434
435	189225	82312875	20.8566536	7.5769849	.002298851	435
436	190096	82881856	.8806130	.5827865	2293578	436
437	190969	83453453	.9045450	.5885793	2288330	437
438	191844	84027672	.9284495	.5943633	2283105	438
439	192721	84604519	.9523268	.6001385	2277904	439
440	193600	85184000	20.9761770	7.6059049	.002272727	440
441	194481	85766121	21.0000000	.6116626	2267574	441
442	195364	86350888	.0237960	.6174116	2262443	442
443	196249	86938307	.0475652	.6231519	2257336	443
444	197136	87528384	.0713075	.6288837	2252252	444
445	198025	88121125	21.0950231	7.6346067	.002247191	445
446	198916	88716536	.1187121	.6403213	2242152	446
447	199809	89314623	.1423745	.6460272	2237136	447
448	200704	89915392	.1660105	.6517247	2232143	448
449	201601	90518849	.1896201	.6574138	2227171	449
450	202500	91125000	21.2132034	7.6630943	.002222222	450
451	203401	91733851	.2367606	.6687665	2217295	451
452	204304	92345408	.2602916	.6744303	2212389	452
453	205209	92959677	.2837967	.6800857	2207506	453
454	206116	93576664	.3072758	.6857328	2202643	454
455	207025	94196375	21.3307290	7.6913717	.002197802	455
456	207936	94818816	.3541565	.6970023	2192982	456
457	208849	95443993	.3775583	.7026246	2188184	457
458	209764	96071912	.4009346	.7082388	2183406	458
459	210681	96702579	.4242853	.7138448	2178649	459
460	211600	97336000	21.4476106	7.7194426	.002173913	460
461	212521	97972181	.4709106	.7250325	2169197	461
462	213444	98611128	.4941853	.7306141	2164502	462
463	214369	99252847	.5174348	.7361877	2159827	463
464	215296	99897344	.5406592	.7417532	2155172	464
465	216225	100544625	21.5638587	7.7473109	.002150538	465
466	217156	101194696	.5870331	.7528606	2145923	466
467	218089	101847563	.6101828	.7584023	2141328	467
468	219024	102503232	.6333077	.7639361	2136752	468
469	219961	103161709	.6564078	.7694620	2132196	469
470	220900	103823000	21.6794834	7.7749801	.002127660	470
471	221841	104487111	.7025344	.7804904	2123142	471
472	222784	105154048	.7255610	.7859928	2118644	472
473	223729	105823817	.7485632	.7914875	2114165	473
474	224676	106496424	.7715411	.7969745	2109705	474
475	225625	107171875	21.7944947	7.8024538	.002105263	475
476	226576	107850176	.8174242	.8079254	2100840	476
477	227529	108531333	.8403297	.8133892	2096436	477
478	228484	109215352	.8632111	.8188456	2092050	478
479	229441	109902239	.8860686	.8242942	2087683	479

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
480	230400	110592000	21.9089023	7.8297353	.002083333	480
481	231361	111284641	.9317122	.8351688	2079002	481
482	232324	111980168	.9544984	.8405949	2074689	482
483	233289	112678587	.9772610	.8460134	2070393	483
484	234256	113379904	22.0000000	.8514244	2066116	484
485	235225	114084125	22.0227155	7.8568281	.002061856	485
486	236196	114791256	.0454077	.8622242	2057613	486
487	237169	115501303	.0680765	.8676130	2053388	487
488	238144	116214272	.0907220	.8729944	2049180	488
489	239121	116930169	.1133444	.8783684	2044990	489
490	240100	117649000	22.1359436	7.8837352	.002040816	490
491	241081	118370771	.1585198	.8890946	2036660	491
492	242064	119095488	.1810730	.8944468	2032520	492
493	243049	119823157	.2036033	.8997917	2028398	493
494	244036	120553784	.2261108	.9051294	2024291	494
495	245025	121287375	22.2485955	7.9104599	.002020202	495
496	246016	122023936	.2710575	.9157832	2016129	496
497	247009	122763473	.2934968	.9210994	2012072	497
498	248004	123505992	.3159136	.9264085	2008032	498
499	249001	124251499	.3383079	.9317104	2004008	499
500	250000	125000000	22.3606798	7.9370053	.002000000	500
501	251001	125751501	.3830293	.9422931	1996008	501
502	252004	126506008	.4053565	.9475739	1992032	502
503	253009	127263527	.4276615	.9528477	1988072	503
504	254016	128024064	.4499443	.9581144	1984127	504
505	255025	128787625	22.4722051	7.9633743	.001980198	505
506	256036	129554216	.4944438	.9686271	1976285	506
507	257049	130323843	.5166605	.9738731	1972387	507
508	258064	131096512	.5388553	.9791122	1968504	508
509	259081	131872229	.5610283	.9843444	1964637	509
510	260100	132651000	22.5831796	7.9895697	.001960784	510
511	261121	133432831	.6053091	.9947883	1956947	511
512	262144	134217728	.6274170	8.0000000	1953125	512
513	263169	135005697	.6495033	.0052049	1949318	513
514	264196	135796744	.6715681	.0104032	1945525	514
515	265225	136590875	22.6936114	8.0155946	.001941748	515
516	266256	137388096	.7156334	.0207794	1937984	516
517	267289	138188413	.7376340	.0259574	1934236	517
518	268324	138991832	.7596134	.0311287	1930502	518
519	269361	139798359	.7815715	.0362935	1926782	519
520	270400	140608000	22.8035085	8.0414515	.001923077	520
521	271441	141420761	.8254244	.0466030	1919386	521
522	272484	142236648	.8473193	.0517479	1915709	522
523	273529	143055667	.8691933	.0568862	1912046	523
524	274576	143877824	.8910463	.0620180	1908397	524
525	275625	144703125	22.9128785	8.0671432	.001904762	525
526	276676	145531576	.9346899	.0722620	1901141	526
527	277729	146363183	.9564806	.0773743	1897533	527
528	278784	147197952	.9782506	.0824800	1893939	528
529	279841	148035889	23.0000000	.0875794	1890359	529
530	280900	148877000	23.0217289	8.0926723	.001886792	530
531	281961	149721291	.0434372	.0977589	1883239	531
532	283024	150568768	.0651252	.1028390	1879699	532
533	284089	151419437	.0867928	.1079128	1876173	533
534	285156	152273304	.1084400	.1129803	1872659	534
535	286225	153130375	23.1300670	8.1180414	.001869159	535
536	287296	153990656	.1516738	.1230962	1865672	536
537	288369	154854153	.1732605	.1281447	1862197	537
538	289444	155720872	.1948270	.1331870	1858736	538
539	290521	156590819	.2163735	.1382230	1855288	539

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
540	291600	157464000	23.2379001	8.1432529	.001851852	540
541	292681	158340421	.2594067	.1482765	1848429	541
542	293764	159220088	.2808935	.1532939	1845018	542
543	294849	160103007	.3023604	.1583051	1841621	543
544	295936	160989184	.3238076	.1633102	1838235	544
545	297025	161878625	23.3452351	8.1683092	.001834862	545
546	298116	162771336	.3666429	.1733020	1831502	546
547	299209	163667323	.3880311	.1782888	1828154	547
548	300304	164566592	.4093998	.1832695	1824818	548
549	301401	165469149	.4307490	.1882441	1821494	549
550	302500	166375000	23.4520788	8.1932127	.001818182	550
551	303601	167284151	.4733892	.1981753	1814882	551
552	304704	168196608	.4946802	.2031319	1811594	552
553	305809	169112377	.5159520	.2080825	1808318	553
554	306916	170031464	.5372046	.2130271	1805054	554
555	308025	170953875	23.5584380	8.2179657	.001801802	555
556	309136	171879616	.5796522	.2228985	1798561	556
557	310249	172808693	.6008474	.2278254	1795332	557
558	311364	173741112	.6220236	.2327463	1792115	558
559	312481	174676879	.6431808	.2376614	1788909	559
560	313600	175616000	23.6643191	8.2425706	.001785714	560
561	314721	176558481	.6854386	.2474740	1782531	561
562	315844	177504328	.7065392	.2523715	1779359	562
563	316969	178453547	.7276210	.2572633	1776199	563
564	318096	179406144	.7486842	.2621492	1773050	564
565	319225	180362125	23.7697286	8.2670294	.001769912	565
566	320356	181321496	.7907545	.2719039	1766784	566
567	321489	182284263	.8117618	.2767726	1763668	567
568	322624	183250432	.8327506	.2816355	1760563	568
569	323761	184220009	.8537209	.2864928	1757469	569
570	324900	185193000	23.8746728	8.2913444	.001754386	570
571	326041	186169411	.8956063	.2961903	1751313	571
572	327184	187149248	.9165215	.3010304	1748252	572
573	328329	188132517	.9374184	.3058651	1745201	573
574	329476	189119224	.9582971	.3106941	1742160	574
575	330625	190109375	23.9791576	8.3155175	.001739130	575
576	331776	191102976	24.0000000	.3203353	1736111	576
577	332929	192100033	.0208243	.3251475	1733102	577
578	334084	193100552	.0416306	.3299542	1730104	578
579	335241	194104539	.0624188	.3347553	1727116	579
580	336400	195112000	24.0831891	8.3395509	.001724138	580
581	337561	196122941	.1039416	.3443410	1721170	581
582	338724	197137368	.1246762	.3491256	1718213	582
583	339889	198155287	.1453929	.3539047	1715266	583
584	341056	199176704	.1660919	.3586784	1712329	584
585	342225	200201625	24.1867732	8.3634466	.001709402	585
586	343396	201230056	.2074369	.3682095	1706485	586
587	344569	202262003	.2280829	.3729668	1703578	587
588	345744	203297472	.2487113	.3777188	1700680	588
589	346921	204336469	.2693222	.3824653	1697793	589
590	348100	205379000	24.2899156	8.3872065	.001694915	590
591	349281	206425071	.3104916	.3919423	1692047	591
592	350464	207474688	.3310501	.3966729	1689189	592
593	351649	208527857	.3515913	.4013981	1686341	593
594	352836	209584584	.3721152	.4061180	1683502	594
595	354025	210644875	24.3926218	8.4108326	.001680672	595
596	355216	211708736	.4131112	.4155419	1677852	596
597	356409	212776173	.4335834	.4202460	1675042	597
598	357604	213847192	.4540385	.4249448	1672241	598
599	358801	214921799	.4744765	.4296383	1669449	599

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
600	360000	216000000	24.4948974	8.4343267	.001666667	600
601	361201	217081801	.5153013	.4390098	1663894	601
602	362404	218167208	.5356883	.4436877	1661130	602
603	363609	219256227	.5560583	.4483605	1658375	603
604	364816	220348864	.5764115	.4530281	1655629	604
605	366025	221445125	24.5967478	8.4576906	.001652893	605
606	367236	222545016	.6170673	.4623479	1650165	606
607	368449	223648543	.6373700	.4670001	1647446	607
608	369664	224755712	.6576560	.4716471	1644737	608
609	370881	225866529	.6779254	.4762892	1642036	609
610	372100	226981000	24.6981781	8.4809261	.001639344	610
611	373321	228099131	.7184142	.4855579	1636661	611
612	374544	229220928	.7386338	.4901848	1633987	612
613	375769	230346397	.7588368	.4948065	1631321	613
614	376996	231475544	.7790234	.4994233	1628664	614
615	378225	232608375	24.7991935	8.5040350	.001626016	615
616	379456	233744896	.8193473	.5086417	1623377	616
617	380689	234885113	.8394847	.5132435	1620746	617
618	381924	236029032	.8596058	.5178403	1618123	618
619	383161	237176659	.8797106	.5224321	1615509	619
620	384400	238328000	24.8997992	8.5270189	.001612903	620
621	385641	239483061	.9198716	.5316009	1610306	621
622	386884	240641848	.9399278	.5361780	1607717	622
623	388129	241804367	.9599679	.5407501	1605136	623
624	389376	242970624	.9799920	.5453173	1602564	624
625	390625	244140625	25.0000000	8.5498797	.001600000	625
626	391876	245314376	.0199920	.5544372	1597444	626
627	393129	246491883	.0399681	.5589899	1594896	627
628	394384	247673152	.0599282	.5635377	1592357	628
629	395641	248858189	.0798724	.5680807	1589825	629
630	396900	250047000	25.0998008	8.5726189	.001587302	630
631	398161	251239591	.1197134	.5771523	1584786	631
632	399424	252435968	.1396102	.5816809	1582278	632
633	400689	253636137	.1594913	.5862047	1579779	633
634	401956	254840104	.1793566	.5907238	1577287	634
635	403225	256047875	25.1992063	8.5952380	.001574803	635
636	404496	257259456	.2190404	.5997476	1572327	636
637	405769	258474853	.2388589	.6042525	1569859	637
638	407044	259694072	.2586619	.6087526	1567398	638
639	408321	260917119	.2784493	.6132480	1564945	639
640	409600	262144000	25.2982213	8.6177388	.001562500	640
641	410881	263374721	.3179778	.6222248	1560062	641
642	412164	264609288	.3377189	.6267063	1557632	642
643	413449	265847707	.3574447	.6311830	1555210	643
644	414736	267089984	.3771551	.6356551	1552795	644
645	416025	268336125	25.3968502	8.6401226	.001550388	645
646	417316	269586136	.4165301	.6445855	1547988	646
647	418609	270840023	.4361947	.6490437	1545595	647
648	419904	272097792	.4558441	.6534974	1543210	648
649	421201	273359449	.4754784	.6579465	1540832	649
650	422500	274625000	25.4950976	8.6623911	.001538462	650
651	423801	275894451	.5147016	.6668310	1536098	651
652	425104	277167808	.5342907	.6712665	1533742	652
653	426409	278445077	.5538647	.6756974	1531394	653
654	427716	279726264	.5734237	.6801237	1529052	654
655	429025	281011375	25.5929678	8.6845456	.001526718	655
656	430336	282300416	.6124969	.6889630	1524390	656
657	431649	283593393	.6320112	.6933759	1522070	657
658	432964	284890312	.6515107	.6977843	1519757	658
659	434281	286191179	.6709953	.7021882	1517451	659

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.
660	435600	287496000	25.6904652	8.7065877	.001515152
661	436921	288804781	.7099203	.7109827	1512859
662	438244	290117528	.7293607	.7153734	1510574
663	439569	291434247	.7487864	.7197596	1508296
664	440896	292754944	.7681975	.7241414	1506024
665	442225	294079625	25.7875939	8.7285187	.001503759
666	443556	295408296	.8069758	.7328918	1501502
667	444889	296740963	.8263431	.7372604	1499250
668	446224	298077632	.8456960	.7416246	1497006
669	447561	299418309	.8650343	.7459846	1494768
670	448900	300763000	25.8843582	8.7503401	.001492537
671	450241	302111711	.9036677	.7546913	1490313
672	451584	303464448	.9229628	.7590383	1488095
673	452929	304821217	.9422435	.7633809	1485884
674	454276	306182024	.9615100	.7677192	1483680
675	455625	307546875	25.9807621	8.7720532	.001481481
676	456976	308915776	26.0000000	.7763830	1479290
677	458329	310288733	.0192237	.7807084	1477105
678	459684	311665752	.0384331	.7850296	1474926
679	461041	313046839	.0576284	.7893466	1472754
680	462400	314432000	26.0768096	8.7936593	.001470588
681	463761	315821241	.0959767	.7979679	1468429
682	465124	317214568	.1151297	.8022721	1466276
683	466489	318611987	.1342687	.8065722	1464129
684	467856	320013504	.1533937	.8108681	1461988
685	469225	321419125	26.1725047	8.8151598	.001459854
686	470596	322828856	.1916017	.8194474	1457726
687	471969	324242703	.2106848	.8237307	1455604
688	473344	325660672	.2297541	.8280099	1453488
689	474721	327082769	.2488095	.8322850	1451379
690	476100	328509000	26.2678511	8.8365559	.001449275
691	477481	329939371	.2868789	.8408227	1447178
692	478864	331373888	.3058929	.8450854	1445087
693	480249	332812557	.3248932	.8493440	1443001
694	481636	334255384	.3438797	.8535985	1440922
695	483025	335702375	26.3628527	8.8578489	.001438849
696	484416	337153536	.3818119	.8620952	1436782
697	485809	338608873	.4007576	.8663375	1434720
698	487204	340068392	.4196896	.8705757	1432665
699	488601	341532099	.4386081	.8748099	1430615
700	490000	343000000	26.4575131	8.8790400	.001428571
701	491401	344472101	.4764046	.8832661	1426534
702	492804	345948408	.4952826	.8874882	1424501
703	494209	347428927	.5141472	.8917063	1422475
704	495616	348913664	.5329983	.8959204	1420455
705	497025	350402625	26.5518361	8.9001304	.001418440
706	498436	351895816	.5706605	.9043366	1416431
707	499849	353393243	.5894716	.9085387	1414427
708	501264	354894912	.6082694	.9127369	1412429
709	502681	356400829	.6270539	.9169311	1410437
710	504100	357911000	26.6458252	8.9211214	.001408451
711	505521	359425431	.6645833	.9253078	1406470
712	506944	360944128	.6833281	.9294902	1404494
713	508369	362467097	.7020598	.9336687	1402525
714	509796	363994344	.7207784	.9378433	1400560
715	511225	365525875	26.7394839	8.9420140	.001398601
716	512656	367061696	.7581763	.9461809	1396648
717	514089	368601813	.7768557	.9503438	1394700
718	515524	370146232	.7955220	.9545029	1392758
719	516961	371694959	.8141754	.9586581	1390821

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
720	518400	373248000	26.8328157	8.9628095	.001388889	720
721	519841	374805361	.8514432	.9669570	1386963	721
722	521284	376367048	.8700577	.9711007	1385042	722
723	522729	377933067	.8886593	.9752406	1383126	723
724	524176	379503424	.9072481	.9793766	1381215	724
725	525625	381078125	26.9258240	8.9835089	.001379310	725
726	527076	382657176	.9443872	.9876373	1377410	726
727	528529	384240583	.9629375	.9917620	1375516	727
728	529984	385828352	.9814751	.9958829	1373626	728
729	531441	387420489	27.0000000	9.0000000	1371742	729
730	532900	389017000	27.0185122	9.0041134	.001369863	730
731	534361	390617891	.0370117	.0082229	1367989	731
732	535824	392223168	.0554985	.0123288	1366120	732
733	537289	393832837	.0739727	.0164309	1364256	733
734	538756	395446904	.0924344	.0205293	1362398	734
735	540225	397065375	27.1108834	9.0246239	.001360544	735
736	541696	398688256	.1293199	.0287149	1358696	736
737	543169	400315553	.1477439	.0328021	1356852	737
738	544644	401947272	.1661554	.0368857	1355014	738
739	546121	403583419	.1845544	.0409655	1353180	739
740	547600	405224000	27.2029410	9.0450417	.001351351	740
741	549081	406869021	.2213152	.0491142	1349528	741
742	550564	408518488	.2396769	.0531831	1347709	742
743	552049	410172407	.2580263	.0572482	1345895	743
744	553536	411830784	.2763634	.0613098	1344086	744
745	555025	413493625	27.2946881	9.0653677	.001342282	745
746	556516	415160936	.3130006	.0694220	1340483	746
747	558009	416832723	.3313007	.0734726	1338688	747
748	559504	418508992	.3495887	.0775197	1336898	748
749	561001	420189749	.3678644	.0815631	1335113	749
750	562500	421875000	27.3861279	9.0856030	.001333333	750
751	564001	423564751	.4043792	.0896392	1331558	751
752	565504	425259008	.4226184	.0936719	1329787	752
753	567009	426957777	.4408455	.0977010	1328021	753
754	568516	428661064	.4590604	.1017265	1326260	754
755	570025	430368875	27.4772633	9,1057485	.001324503	755
756	571536	432081216	.4954542	.1097669	1322751	756
757	573049	433798093	.5136330	.1137818	1321004	757
758	574564	435519512	.5317998	.1177931	1319261	758
759	576081	437245479	.5499546	.1218010	1317523	759
760	577600	438976000	27.5680975	9.1258053	.001315789	760
761	579121	440711081	.5862284	.1298061	1314060	761
762	580644	442450728	.6043475	.1338034	1312336	762
763	582169	444194947	.6224546	.1377971	1310616	763
764	583696	445943744	.6405499	.1417874	1308901	764
765	585225	447697125	27.6586334	9.1457742	.001307190	765
766	586756	449455096	.6767050	.1497576	1305483	766
767	588289	451217663	.6947648	.1537375	1303781	767
768	589824	452984832	.7128129	.1577139	1302083	768
769	591361	454756609	.7308492	.1616869	1300390	769
770	592900	456533000	27.7488739	9.1656565	.001298701	770
771	594441	458314011	.7668868	.1696225	1297017	771
772	595984	460099648	.7848880	.1735852	1295337	772
773	597529	461889917	.8028775	.1775445	1293661	773
774	599076	463684824	.8208555	.1815003	1291990	774
775	600625	465484375	27.8388218	9.1854527	.001290323	775
776	602176	467288576	.8567766	.1894018	1288660	776
777	603729	469097433	.8747197	.1933474	1287001	777
778	605284	470910952	.8926514	.1972897	1285347	778
779	606841	472729139	.9105715	.2012286	1283697	779

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
780	608400	474552000	27.9284801	9.2051641	.001282051	780
781	609961	476379541	.9463772	.2090962	1280410	781
782	611524	478211768	.9642629	.2130250	1278772	782
783	613089	480048687	.9821372	.2169505	1277139	783
784	614656	481890304	28.0000000	.2208726	1275510	784
785	616225	483736625	28.0178515	9.2247914	.001273885	785
786	617796	485587656	.0356915	.2287068	1272265	786
787	619369	487443403	.0535203	.2326189	1270648	787
788	620944	489303872	.0713377	.2365277	1269036	788
789	622521	491169069	.0891438	.2404333	1267427	789
790	624100	493039000	28.1069386	9.2443355	.001265823	790
791	625681	494913671	.1247222	.2482344	1264223	791
792	627264	496793088	.1424946	.2521300	1262626	792
793	628849	498677257	.1602557	.2560224	1261034	793
794	630436	500566184	.1780056	.2599114	1259446	794
795	632025	502459875	28.1957444	9.2637973	.001257862	795
796	633616	504358336	.2134720	.2676798	1256281	796
797	635209	506261573	.2311884	.2715592	1254705	797
798	636804	508169592	.2488938	.2754352	1253133	798
799	638401	510082399	.2665881	.2793081	1251564	799
800	640000	512000000	28.2842712	9.2831777	.001250000	800
801	641601	513922401	.3019434	.2870440	1248439	801
802	643204	515849608	.3196045	.2909072	1246883	802
803	644809	517781627	.3372546	.2947671	1245330	803
804	646416	519718464	.3548938	.2986239	1243781	804
805	648025	521660125	28.3725219	9.3024775	.001242236	805
806	649636	523606616	.3901391	.3063278	1240695	806
807	651249	525557943	.4077454	.3101750	1239157	807
808	652864	527514112	.4253408	.3140190	1237624	808
809	654481	529475129	.4429253	.3178599	1236094	809
810	656100	531441000	28.4604989	9.3216975	.001234568	810
811	657721	533411731	.4780617	.3255320	1233046	811
812	659344	535387328	.4956137	.3293634	1231527	812
813	660969	537367797	.5131549	.3331916	1230012	813
814	662596	539353144	.5306852	.3370167	1228501	814
815	664225	541343375	28.5482048	9.3408386	.001226994	815
816	665856	543338496	.5657137	.3446575	1225490	816
817	667489	545338513	.5832119	.3484731	1223990	817
818	669124	547343432	.6006993	.3522857	1222494	818
819	670761	549353259	.6181760	.3560952	1221001	819
820	672400	551368000	28.6356421	9.3599016	.001219512	820
821	674041	553387661	.6530976	.3637049	1218027	821
822	675684	555412248	.6705424	.3675051	1216545	822
823	677329	557441767	.6879766	.3713022	1215067	823
824	678976	559476224	.7054002	.3750963	1213592	824
825	680625	561515625	28.7228132	9.3788873	.001212121	825
826	682276	563559976	.7402157	.3826752	1210654	826
827	683929	565609283	.7576077	.3864600	1209190	827
828	685584	567663552	.7749891	.3902419	1207729	828
829	687241	569722789	.7923601	.3940206	1206273	829
830	688900	571787000	28.8097206	9.3977964	.001204819	830
831	690561	573856191	.8270706	.4015691	1203369	831
832	692224	575930368	.8444102	.4053387	1201923	832
833	693889	578009537	.8617394	.4091054	1200480	833
834	695556	580093704	.8790582	.4128690	1199041	834
835	697225	582182875	28.8963666	9.4166297	.001197605	835
836	698896	584277056	.9136646	.4203873	1196172	836
837	700569	586376253	.9309523	.4241420	1194743	837
838	702244	588480472	.9482297	.4278936	1193317	838
839	703921	590589719	.9654967	.4316423	1191895	839

TABLE XXI.—SQUARES, CUBES, SQUARE ROOTS,

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
840	705600	592704000	28.9827535	9.4353880	.001190476	840
841	707281	594823321	29.0000000	.4391307	1189061	841
842	708964	596947688	.0172363	.4428704	1187648	842
843	710649	599077107	.0344623	.4466072	1186240	843
844	712336	601211584	.0516781	.4503410	1184834	844
845	714025	603351125	29.0688837	9.4540719	.001183432	845
846	715716	605495736	.0860791	.4577999	1182033	846
847	717409	607645423	.1032644	.4615249	1180638	847
848	719104	609800192	.1204396	.4652470	1179245	848
849	720801	611960049	.1376046	.4689661	1177856	849
850	722500	614125000	29.1547595	9.4726824	.001176471	850
851	724201	616295051	.1719043	.4763957	1175088	851
852	725904	618470208	.1890390	.4801061	1173709	852
853	727609	620650477	.2061637	.4838136	1172333	853
854	729316	622835864	.2232784	.4875182	1170960	854
855	731025	625026375	29.2403830	9.4912200	.001169591	855
856	732736	627222016	.2574777	.4949188	1168224	856
857	734449	629422793	.2745623	.4986147	1166861	857
858	736164	631628712	.2916370	.5023078	1165501	858
859	737881	633839779	.3087018	.5059980	1164144	859
860	739600	636056000	29.3257566	9.5096854	.001162791	860
861	741321	638277381	.3428015	.5133699	1161440	861
862	743044	640503928	.3598365	.5170515	1160093	862
863	744769	642735647	.3768616	.5207303	1158749	863
864	746496	644972544	.3938769	.5244063	1157407	864
865	748225	647214625	29.4108823	9.5280794	.001156069	865
866	749956	649461896	.4278779	.5317497	1154734	866
867	751689	651714363	.4448637	.5354172	1153403	867
868	753424	653972032	.4618397	.5390818	1152074	868
869	755161	656234909	.4788059	.5427437	1150748	869
870	756900	658503000	29.4957624	9.5464027	.001149425	870
871	758641	660776311	.5127091	.5500589	1148106	871
872	760384	663054848	.5296461	.5537123	1146789	872
873	762129	665338617	.5465734	.5573630	1145475	873
874	763876	667627624	.5634910	.5610108	1144165	874
875	765625	669921875	29.5803989	9.5646559	.001142857	875
876	767376	672221376	.5972972	.5682982	1141553	876
877	769129	674526133	.6141858	.5719377	1140251	877
878	770884	676836152	.6310648	.5755745	1138952	878
879	772641	679151439	.6479342	.5792085	1137656	879
880	774400	681472000	29.6647939	9.5828397	.001136364	880
881	776161	683797841	.6816442	.5864682	1135074	881
882	777924	686128968	.6984848	.5900939	1133787	882
883	779689	688465387	.7153159	.5937169	1132503	883
884	781456	690807104	.7321375	.5973373	1131222	884
885	783225	693154125	29.7489496	9.6009548	.001129944	885
886	784996	695506456	.7657521	.6045696	1128668	886
887	786769	697864103	.7825452	.6081817	1127396	887
888	788544	700227072	.7993289	.6117911	1126126	888
889	790321	702595369	.8161030	.6153977	1124859	889
890	792100	704969000	29.8328678	9.6190017	.001123596	890
891	793881	707347971	.8496231	.6226030	1122334	891
892	795664	709732288	.8663690	.6262016	1121076	892
893	797449	712121957	.8831056	.6297975	1119821	893
894	799236	714516984	.8998328	.6333907	1118568	894
895	801025	716917375	29.9165506	9.6369812	.001117318	895
896	802816	719323136	.9332591	.6405690	1116071	896
897	804609	721734273	.9499583	.6441542	1114827	897
898	806404	724150792	.9666481	.6477367	1113586	898
899	808201	726572699	.9833287	.6513166	1112347	899

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
900	810000	729000000	30.0000000	9.6548938	.001111111	900
901	811801	731432701	.0166620	.6584684	1109878	901
902	813604	733870808	.0333148	.6620403	1108647	902
903	815409	736314327	.0499584	.6656096	1107420	903
904	817216	738763264	.0665928	.6691762	1106195	904
905	819025	741217625	30.0832179	9.6727403	.001104972	905
906	820836	743677416	.0998339	.6763017	1103753	906
907	822649	746142643	.1164407	.6798604	1102536	907
908	824464	748613312	.1330383	.6834166	1101322	908
909	826281	751089429	.1496269	.6869701	1100110	909
910	828100	753571000	30.1662063	9.6905211	.001098901	910
911	829921	756058031	.1827765	.6940694	1097695	911
912	831744	758550528	.1993377	.6976151	1096491	912
913	833569	761048497	.2158899	.7011583	1095290	913
914	835396	763551944	.2324329	.7046989	1094092	914
915	837225	766060875	30.2489669	9.7082369	.001092896	915
916	839056	768575296	.2654919	.7117723	1091703	916
917	840889	771095213	.2820079	.7153051	1090513	917
918	842724	773620632	.2985148	.7188354	1089325	918
919	844561	776151559	.3150128	.7223631	1088139	919
920	846400	778688000	30.3315018	9.7258883	.001086957	920
921	848241	781229061	.3479818	.7294109	1085776	921
922	850084	783777448	.3644529	.7329309	1084599	922
923	851929	786330467	.3809151	.7364484	1083424	923
924	853776	788889024	.3973683	.7399634	1082251	924
925	855625	791453125	30.4138127	9.7434758	.001081081	925
926	857476	794022776	.4302481	.7469857	1079914	926
927	859329	796597983	.4466747	.7504930	1078749	927
928	861184	799178752	.4630924	.7539979	1077586	928
929	863041	801765089	.4795013	.7575002	1076426	929
930	864900	804357000	30.4959014	9.7610001	.001075269	930
931	866761	806954491	.5122926	.7644974	1074114	931
932	868624	809557568	.5286750	.7679922	1072961	932
933	870489	812166237	.5450487	.7714845	1071811	933
934	872356	814780504	.5614136	.7749743	1070664	934
935	874225	817400375	30.5777697	9.7784616	.001069519	935
936	876096	820025856	.5941171	.7819466	1068376	936
937	877969	822656953	.6104557	.7854288	1067236	937
938	879844	825293672	.6267857	.7889087	1066098	938
939	881721	827936019	.6431069	.7923861	1064963	939
940	883600	830584000	30.6594194	9.7958611	.001063830	940
941	885481	833237621	.6757233	.7993336	1062699	941
942	887364	835896888	.6920185	.8028036	1061571	942
943	889249	838561807	.7083051	.8062711	1060445	943
944	891136	841232384	.7245830	.8097362	1059322	944
945	893025	843908625	30.7408523	9.8131989	.001058201	945
946	894916	846590536	.7571130	.8166591	1057082	946
947	896809	849278123	.7733651	.8201169	1055966	947
948	898704	851971392	.7896086	.8235723	1054852	948
949	900601	854670349	.8058436	.8270252	1053741	949
950	902500	857375000	30.8220700	9.8304757	.001052632	950
951	904401	860085351	.8382879	.8339238	1051525	951
952	906304	862801408	.8544972	.8373695	1050420	952
953	908209	865523177	.8706981	.8408127	1049318	953
954	910116	868250664	.8868904	.8442536	1048218	954
955	912025	870983875	30.9030743	9.8476920	.001047120	955
956	913936	873722816	.9192497	.8511280	1046025	956
957	915849	876467493	.9354166	.8545617	1044932	957
958	917764	879217912	.9515751	.8579929	1043841	958
959	919681	881974079	.9677251	.8614218	1042753	959

TABLE XXI.—SQUARES, CUBES, ETC.

No.	Squares.	Cubes.	Square Roots.	Cube Roots.	Reciprocals.	No.
960	921600	884736000	30.9838668	9.8648483	.001041667	960
961	923521	887503681	31.0000000	.8682724	1040583	961
962	925444	890277128	.0161248	.8716941	1039501	962
963	927369	893056347	.0322413	.8751135	1038422	963
964	929296	895841344	.0483494	.8785305	1037344	964
965	931225	898632125	31.0644491	9.8819451	.001036269	965
966	933156	901428696	.0805405	.8853574	1035197	966
967	935089	904231063	.0966236	.8887673	1034126	967
968	937024	907039232	.1126984	.8921749	1033058	968
969	938961	909853209	.1287648	.8955801	1031992	969
970	940900	912673000	31.1448230	9.8989830	.001030928	970
971	942841	915498611	.1608729	.9023835	1029866	971
972	944784	918330048	.1769145	.9057817	1028807	972
973	946729	921167317	.1929479	.9091776	1027749	973
974	948676	924010424	.2089731	.9125712	1026694	974
975	950625	926859375	31.2249900	9.9159624	.001025641	975
976	952576	929714176	.2409987	.9193513	1024590	976
977	954529	932574833	.2569992	.9227379	1023541	977
978	956484	935441352	.2729915	.9261222	1022495	978
979	958441	938313739	.2889757	9295042	1021450	979
980	960400	941192000	31.3049517	9.9328839	.001020408	980
981	962361	944076141	.3209195	.9362613	1019368	981
982	964324	946966168	.3368792	.9396363	1018330	982
983	966289	949862087	.3528308	.9430092	1017294	983
984	968256	952763904	.3687743	.9463797	1016260	984
985	970225	955671625	31.3847097	9.9497479	.001015228	985
986	972196	958585256	.4006369	.9531138	1014199	986
987	974169	961504803	.4165561	.9564775	1013171	987
988	976144	964430272	.4324673	.9598389	1012146	988
989	978121	967361669	.4483704	.9631981	1011122	989
990	980100	970299000	31.4642654	9.9665549	.001010101	990
991	982081	973242271	.4801525	.9699095	1009082	991
992	984064	976191488	.4960315	.9732619	1008065	992
993	986049	979146657	.5119025	.9766120	1007049	993
994	988036	982107784	.5277655	.9799599	1006036	994
995	990025	985074875	31.5436206	9.9833055	.001005025	995
996	992016	988047936	.5594677	.9866488	1004016	996
997	994009	991026973	.5753068	.9899900	1003009	997
998	996004	994011992	.5911380	.9933289	1002004	998
999	998001	997002999	.6069613	.9966656	1001001	999
1000	1000000	1000000000	31.6227766	10.0000000	.001000000	1000
1001	1002001	1003003001	.6385840	.0033322	0999001	1001
1002	1004004	1006012008	.6543836	.0066622	0998004	1002
1003	1006009	1009027027	.6701752	.0099899	0997009	1003
1004	1008016	1012048064	.6859590	.0133155	0996016	1004
1005	1010025	1015075125	31.7017349	10.0166389	.000995025	1005
1006	1012036	1018108216	.7175030	.0199601	0994036	1006
1007	1014049	1021147343	.7332633	.0232791	0993049	1007
1008	1016064	1024192512	.7490157	.0265958	0992063	1008
1009	1018081	1027243729	.7647603	.0299104	0991080	1009
1010	1020100	1030301000	31.7804972	10.0332228	.000990099	1010
1011	1022121	1033364331	.7962262	.0365330	0989120	1011
1012	1024144	1036433728	.8119474	.0398410	0988142	1012
1013	1026169	1039509197	.8276609	.0431469	0987167	1013
1014	1028196	1042590744	.8433666	.0464506	0986193	1014
1015	1030225	1045678375	31.8590646	10.0497521	.000985222	1015
1016	1032256	1048772096	.8747549	.0530514	0984252	1016
1017	1034289	1051871913	.8904374	.0563485	0983284	1017
1018	1036324	1054977832	.9061123	.0596435	0982318	1018
1019	1038361	1058089859	.9217794	.0629364	0981354	1019

TABLE XXII.—TURNOUTS FROM TANGENTS FOR STUB SWITCH.

Gauge 4′ 8½″=4.7083

Frog No.	Frog Angle	Rad. of Turnout	Deg. of Turnout	Lead E.	Crotch No.	Crotch Angle	Crotch Lead	Frog No.
4	14°15′	150.67	38°46′	37.67	2.82	20°08′	26.84	4
4½	12 41	190.69	30 24	42.37	3.17	17 55	30.15	4½
5	11 25	235.42	24 31	47.08	3.53	16 08	33.46	5
5½	10 23	284.85	20 13	51.79	3.88	14 41	36.77	5½
6	9 32	339.00	16 58	56.50	4.24	13 28	40.09	6
6½	8 48	397.85	14 26	61.21	4.59	12 26	43.41	6½
7	8 10	461.42	12 27	65.92	4.94	11 33	46.73	7
7½	7 38	529.69	10 50	70.62	5.30	10 47	50.05	7½
8	7 09	602.67	9 31	75.33	5.65	10 07	53.37	8
8½	6 44	680.35	8 26	80.04	6.01	9 31	56.70	8½
9	6 22	762.75	7 31	84.75	6.36	8 59	60.02	9
9½	6 02	849.85	6 45	89.46	6.71	8 31	63.34	9½
10	5 43	941.67	6 05	94.17	7.07	8 06	66.67	10
10½	5 27	1038.19	5 31	98.88	7.42	7 43	69.99	10½
11	5 12	1139.42	5 02	103.58	7.77	7 22	73.32	11
11½	4 59	1245.35	4 36	108.29	8.13	7 02	76.65	11½
12	4 46	1356.00	4 14	113.00	8.48	6 45	79.97	12

Gauge 3′

Frog No.	Frog Angle	Rad. of Turnout	Deg. of Turnout	Lead E.	Crotch No.	Crotch Angle	Crotch Lead	Frog No.
4	14°15′	96.0	62°47′	24.	2.82	20°08′	17.10	4
4½	12 41	121.5	48 36	27.	3.17	17 55	19.21	4½
5	11 25	150.0	38 57	30.	3.53	16 08	21.32	5
5½	10 23	181.5	31 59	33.	3.88	14 41	23.43	5½
6	9 32	216.0	26 46	36.	4.24	13 28	25.54	6
6½	8 48	253.5	22 45	39.	4.59	12 26	27.66	6½
7	8 10	294.0	19 35	42.	4.94	11 33	29.77	7
7½	7 38	337.5	17 02	45.	5.30	10 47	31.89	7½
8	7 09	384.0	14 58	48.	5.65	10 07	34.01	8
8½	6 44	433.5	13 15	51.	6.01	9 31	36.12	8½
9	6 22	486.0	11 49	54.	6.36	8 59	38.24	9
9½	6 02	541.5	10 36	57.	6.71	8 31	40.36	9½
10	5 43	600.0	9 34	60.	7.07	8 06	42.48	10
10½	5 27	661.5	8 40	63.	7.42	7 43	44.60	10½
11	5 12	726.0	7 54	66.	7.77	7 22	46.72	11
11½	4 59	793.5	7 14	69.	8.13	7 02	48.84	11½
12	4 46	864.0	6 38	72.	8.48	6 45	50.96	12

Gauge 4′ 9″=4.75

Frog No.	Frog Angle	Rad. of Turnout	Deg. of Turnout	Lead E.	Crotch No.	Crotch Angle	Crotch Lead	Frog No.
4	14°15′	152.00	38°25′	38.00	2.82	20°08′	27.08	4
4½	12 41	192.38	30 08	42.75	3.17	17 55	30.41	4½
5	11 25	237.50	24 18	47.50	3.53	16 08	33.76	5
5½	10 23	287.38	20 02	52.25	3.88	14 41	37.10	5½
6	9 32	342.00	16 49	57.00	4.24	13 28	40.44	6
6½	8 48	401.38	14 19	61.75	4.59	12 26	43.79	6½
7	8 10	465.50	12 20	66.50	4.94	11 33	47.14	7
7½	7 38	534.38	10 44	71.25	5.30	10 47	50.49	7½
8	7 09	608.00	9 26	76.00	5.65	10 07	53.84	8
8½	6 44	686.38	8 21	80.75	6.01	9 31	57.20	8½
9	6 22	769.50	7 27	85.50	6.36	8 59	60.55	9
9½	6 02	857.38	6 41	90.25	6.71	8 31	63.90	9½
10	5 43	950.00	6 02	95.00	7.07	8 06	67.26	10
10½	5 27	1047.38	5 28	99.75	7.42	7 43	70.61	10½
11	5 12	1149.50	4 59	104.50	7.77	7 22	73.97	11
11½	4 59	1256.38	4 34	109.25	8.13	7 02	77.32	11½
12	4 46	1368.00	4 11	114.00	8.48	6 45	80.68	12

TABLE XXIII.—VELOCITY HEIGHTS.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03
1	0.04	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	0.13
2	0.14	0.16	0.17	0.19	0.20	0.22	0.24	0.26	0.28	0.30
3	0.32	0.34	0.36	0.39	0.41	0.43	0.46	0.49	0.51	0.54
4	0.57	0.60	0.63	0.66	0.69	0.72	0.75	0.78	0.82	0.85
5	0.89	0.92	0.96	1.00	1.04	1.07	1.11	1.15	1.19	1.24
6	1.28	1.32	1.36	1.41	1.45	1.50	1.55	1.59	1.64	1.69
7	1.74	1.79	1.84	1.89	1.94	2.00	2.05	2.10	2.16	2.22
8	2.27	2.33	2.39	2.45	2.50	2.56	2.63	2.69	2.75	2.81
9	2.88	2.94	3.00	3.07	3.14	3.20	3.27	3.34	3.41	3.48
10	3.55	3.62	3.69	3.77	3.84	3.91	3.99	4.06	4.14	4.22
11	4.30	4.37	4.45	4.53	4.61	4.69	4.78	4.86	4.94	5.03
12	5.11	5.20	5.28	5.37	5.46	5.55	5.64	5.73	5.82	5.91
13	6.00	6.09	6.19	6.28	6.37	6.47	6.57	6.66	6.76	6.86
14	6.96	7.06	7.16	7.26	7.36	7.46	7.57	7.67	7.78	7.88
15	7.99	8.09	8.20	8.31	8.42	8.53	8.64	8.75	8.86	8.97
16	9.09	9.20	9.32	9.43	9.55	9.66	9.78	9.89	10.02	10.14
17	10.26	10.38	10.50	10.62	10.75	10.87	11.00	11.12	11.25	11.37
18	11.50	11.63	11.76	11.89	12.02	12.15	12.28	12.41	12.55	12.68
19	12.82	12.95	13.09	13.22	13.36	13.50	13.64	13.78	13.92	14.06
20	14.20	14.34	14.49	14.63	14.77	14.92	15.06	15.21	15.36	15.51
21	15.66	15.80	15.96	16.11	16.26	16.41	16.56	16.72	16.87	17.03
22	17.18	17.34	17.50	17.65	17.81	17.97	18.13	18.29	18.45	18.62
23	18.78	18.94	19.11	19.27	19.44	19.60	19.77	19.94	20.11	20.28
24	20.45	20.62	20.79	20.96	21.14	21.31	21.48	21.66	21.83	22.01
25	22.19	22.37	22.54	22.72	22.90	23.08	23.27	23.45	23.63	23.81
26	24.00	24.18	24.37	24.55	24.74	24.93	25.12	25.31	25.50	25.69
27	25.88	26.07	26.26	26.46	26.65	26.85	27.04	27.24	27.44	27.63
28	27.83	28.03	28.23	28.43	28.63	28.83	29.04	29.24	29.45	29.65
29	29.86	30.06	30.27	30.48	30.68	30.89	31.10	31.31	31.53	31.74
30	31.95	32.16	32.38	32.59	32.81	33.02	33.24	33.46	33.68	33.90
31	34.12	34.34	34.56	34.78	35.00	35.22	35.45	35.67	35.90	36.13
32	36.35	36.58	36.81	37.04	37.27	37.50	37.73	37.96	38.19	38.43
33	38.66	38.89	39.13	39.37	39.60	39.84	40.08	40.32	40.56	40.80
34	41.04	41.28	41.52	41.77	42.01	42.25	42.50	42.75	42.99	43.24
35	43.49	43.74	43.99	44.24	44.49	44.74	44.99	45.24	45.50	45.75
36	46.01	46.26	46.52	46.78	47.04	47.29	47.55	47.81	48.08	48.34
37	48.60	48.86	49.13	49.39	49.66	49.92	50.19	50.46	50.72	50.99
38	51.26	51.53	51.80	52.07	52.35	52.62	52.89	53.17	53.44	53.72
39	54.00	54.27	54.55	54.83	55.11	55.39	55.67	55.95	56.23	56.52
40	56.80	57.08	57.37	57.66	57.94	58.23	58.52	58.81	59.09	59.38
41	59.68	59.97	60.26	60.55	60.85	61.14	61.43	61.73	62.03	62.32
42	62.62	62.92	63.22	63.52	63.82	64.12	64.42	64.73	65.03	65.33
43	65.64	65.95	66.25	66.56	66.87	67.17	67.48	67.79	68.10	68.42
44	68.73	69.04	69.35	69.67	69.98	70.30	70.62	70.93	71.25	71.57
45	71.89	72.21	72.53	72.85	73.17	73.49	73.82	74.14	74.47	74.79
46	75.12	75.44	75.77	76.10	76.43	76.76	77.09	77.42	77.75	78.09
47	78.42	78.75	79.09	79.42	79.76	80.10	80.43	80.77	81.11	81.45
48	81.79	82.13	82.48	82.82	83.16	83.50	83.85	84.19	84.54	84.89
49	85.24	85.58	85.93	86.28	86.63	86.98	87.34	87.69	88.04	88.40
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE XXIII. — VELOCITY HEIGHTS.

	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
50	88.75	89.11	89.46	89.82	90.18	90.53	90.89	91.25	91.61	91.97
51	92.34	92.70	93.06	93.42	93.79	94.15	94.52	94.89	95.26	95.62
52	95.99	96.36	96.73	97.10	97.47	97.85	98.22	98.59	98.97	99.34
53	99.72	100.10	100.47	100.85	101.23	101.61	101.99	102.37	102.75	103.13
54	103.52	103.90	104.29	104.67	105.06	105.44	105.83	106.22	106.61	107.00
55	107.39	107.78	108.17	108.56	108.96	109.35	109.74	110.14	110.53	110.93
56	111.33	111.73	112.12	112.52	112.92	113.32	113.73	114.13	114.53	114.94
57	115.34	115.74	116.15	116.56	116.96	117.37	117.78	118.19	118.60	119.01
58	119.42	119.83	120.25	120.66	121.07	121.49	121.91	122.32	122.74	123.16
59	123.58	123.99	124.41	124.84	125.26	125.68	126.10	126.53	126.95	127.37
60	127.80	128.23	128.65	129.08	129.51	129.94	130.37	130.80	131.23	131.66
61	132.10	132.53	132.96	133.40	133.83	134.27	134.71	135.14	135.58	136.02
62	136.46	136.90	137.34	137.79	138.23	138.67	139.12	139.56	140.01	140.45
63	140.90	141.35	141.80	142.24	142.69	143.14	143.60	144.05	144.50	144.95
64	145.41	145.86	146.32	146.77	147.23	147.69	148.15	148.61	149.07	149.53
65	149.99	150.45	150.91	151.38	151.84	152.30	152.77	153.24	153.70	154.17
66	154.64	155.11	155.58	156.05	156.52	156.99	157.46	157.94	158.41	158.88
67	159.36	159.84	160.31	160.79	161.27	161.75	162.23	162.71	163.29	163.67
68	164.15	164.64	165.12	165.60	166.09	166.57	167.06	167.55	168.04	168.53
69	169.02	169.51	170.00	170.49	170.98	171.47	171.97	172.46	172.96	173.45
70	173.95	174.45	174.95	175.44	175.94	176.44	176.94	177.45	177.95	178.45
71	178.96	179.46	179.97	180.47	180.98	181.48	181.99	182.50	183.01	183.52
72	184.03	184.54	185.06	185.57	186.08	186.60	187.11	187.63	188.14	188.66
73	189.18	189.70	190.22	190.74	191.26	191.78	192.30	192.82	193.35	193.87
74	194.40	194.92	195.45	195.98	196.51	197.03	197.56	198.09	198.62	199.16
75	199.69	200.22	200.75	201.29	201.82	202.36	202.90	203.43	203.97	204.51
76	205.05	205.59	206.13	206.67	207.21	207.75	208.30	208.84	209.39	209.93
77	210.48	211.03	211.57	212.12	212.67	213.22	213.77	214.32	214.88	215.43
78	215.98	216.54	217.09	217.65	218.20	218.76	219.32	219.88	220.44	220.99
79	221.56	222.12	222.68	223.24	223.80	224.37	224.93	225.50	226.07	226.63
80	227.20	227.77	228.34	228.91	229.48	230.05	230.62	231.19	231.77	232.34
81	232.92	233.49	234.07	234.64	235.22	235.80	236.38	236.96	237.54	238.12
82	238.70	239.28	239.87	240.45	241.04	241.62	242.21	242.79	243.38	243.97
83	244.56	245.15	245.74	246.33	246.92	247.51	248.11	248.70	249.30	249.89
84	250.49	251.08	251.68	252.28	252.88	253.48	254.08	254.68	255.28	255.88
85	256.49	257.09	257.70	258.30	258.91	259.51	260.12	260.73	261.34	261.95
86	262.56	263.17	263.78	264.39	265.01	265.62	266.23	266.85	267.47	268.08
87	268.70	269.32	269.94	270.56	271.18	271.80	272.42	273.04	273.66	274.29
88	274.91	275.54	276.16	276.79	277.42	278.04	278.67	279.30	279.93	280.56
89	281.20	281.83	282.46	283.09	283.73	284.36	285.00	285.64	286.27	286.91
90	287.55	288.19	288.83	289.47	290.11	290.75	291.40	292.04	292.68	293.33
91	293.98	294.62	295.27	295.92	296.57	297.21	297.86	298.52	299.17	299.82
92	300.47	301.13	301.78	302.43	303.09	303.75	304.40	305.06	305.72	306.38
93	307.04	307.70	308.36	309.02	309.69	310.35	311.01	311.68	312.34	313.01
94	313.68	314.35	315.01	315.68	316.35	317.02	317.70	318.37	319.04	319.71
95	320.39	321.06	321.74	322.41	323.09	323.77	324.45	325.13	325.81	326.49
96	327.17	327.85	328.53	329.22	329.90	330.58	331.27	331.96	332.64	333.33
97	334.02	334.71	335.40	336.09	336.78	337.47	338.16	338.86	339.55	340.25
98	340.94	341.64	342.34	343.03	343.73	344.43	345.13	345.83	346.53	347.23
99	347.94	348.64	349.34	350.05	350.75	351.46	352.17	352.87	353.58	354.29
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9

TABLE XXIV.—RISE PER MILE OF VARIOUS GRADES

Grade per Station	Rise per Mile	Grade per Station	Rise per Mile	Grade per Station	Rise per Mile	Grade per Station	Rise per Mile
.01	.528	.61	32.208	1.21	63.888	1.81	95.568
.02	1.056	.62	32.736	1.22	64.416	1.82	96.096
.03	1.584	.63	33.264	1.23	64.944	1.83	96.624
.04	2.112	.64	33.792	1.24	65.472	1.84	97.152
.05	2.640	.65	34.320	1.25	66.000	1.85	97.680
.06	3.168	.66	34.848	1.26	66.528	1.86	98.208
.07	3.696	.67	35.376	1.27	67.056	1.87	98.736
.08	4.224	.68	35.904	1.28	67.584	1.88	99.264
.09	4.752	.69	36.432	1.29	68.112	1.89	99.792
.10	5.280	.70	36.960	1.30	68.640	1.90	100.320
.11	5.808	.71	37.488	1.31	69.168	1.91	100.848
.12	6.336	.72	38.016	1.32	69.696	1.92	101.376
.13	6.864	.73	38.544	1.33	70.224	1.93	101.904
.14	7.392	.74	39.072	1.34	70.752	1.94	102.432
.15	7.920	.75	39.600	1.35	71.280	1.95	102.960
.16	8.448	.76	40.128	1.36	71.808	1.96	103.488
.17	8.976	.77	40.656	1.37	72.336	1.97	104.016
.18	9.504	.78	41.184	1.38	72.864	1.98	104.544
.19	10.032	.79	41.712	1.39	73.392	1.99	105.072
.20	10.560	.80	42.240	1.40	73.920	2.00	105.600
.21	11.088	.81	42.768	1.41	74.448	2.10	110.880
.22	11.616	.82	43.296	1.42	74.976	2.20	116.160
.23	12.144	.83	43.824	1.43	75.504	2.30	121.440
.24	12.672	.84	44.352	1.44	76.032	2.40	126.720
.25	13.200	.85	44.880	1.45	76.560	2.50	132.000
.26	13.728	.86	45.408	1.46	77.088	2.60	137.280
.27	14.256	.87	45.936	1.47	77.616	2.70	142.560
.28	14.784	.88	46.464	1.48	78.144	2.80	147.840
.29	15.312	.89	46.992	1.49	78.672	2.90	153.120
.30	15.840	.90	47.520	1.50	79.200	3.00	158.400
.31	16.368	.91	48.048	1.51	79.728	3.10	163.680
.32	16.896	.92	48.576	1.52	80.256	3.20	168.960
.33	17.424	.93	49.104	1.53	80.784	3.30	174.240
.34	17.952	.94	49.632	1.54	81.312	3.40	179.520
.35	18.480	.95	50.160	1.55	81.840	3.50	184.800
.36	19.008	.96	50.688	1.56	82.368	3.60	190.080
.37	19.536	.97	51.216	1.57	82.896	3.70	195.360
.38	20.064	.98	51.744	1.58	83.424	3.80	200.640
.39	20.592	.99	52.272	1.59	83.952	3.90	205.920
.40	21.120	1.00	52.800	1.60	84.480	4.00	211.200
.41	21.648	1.01	53.328	1.61	85.008	4.10	216.480
.42	22.176	1.02	53.856	1.62	85.536	4.20	221.760
.43	22.704	1.03	54.384	1.63	86.064	4.30	227.040
.44	23.232	1.04	54.912	1.64	86.592	4.40	232.320
.45	23.760	1.05	55.440	1.65	87.120	4.50	237.600
.46	24.288	1.06	55.968	1.66	87.648	4.60	242.880
.47	24.816	1.07	56.496	1.67	88.176	4.70	248.160
.48	25.344	1.08	57.024	1.68	88.704	4.80	253.440
.49	25.872	1.09	57.552	1.69	89.232	4.90	258.720
.50	26.400	1.10	58.080	1.70	89.760	5.00	264.000
.51	26.928	1.11	58.608	1.71	90.288	5.10	269.280
.52	27.456	1.12	59.136	1.72	90.816	5.20	274.560
.53	27.984	1.13	59.664	1.73	91.344	5.30	279.840
.54	28.512	1.14	60.192	1.74	91.872	5.40	285.120
.55	29.040	1.15	60.720	1.75	92.400	5.50	290.400
.56	29.568	1.16	61.248	1.76	92.928	5.60	295.680
.57	30.096	1.17	61.776	1.77	93.456	5.70	300.960
.58	30.624	1.18	62.304	1.78	93.984	5.80	306.240
.59	31.152	1.19	62.832	1.79	94.512	5.90	311.520
.60	31.680	1.20	63.360	1.80	95.040	6.00	316.800

TABLE XXV.—ELEVATION OF OUTER RAIL ON CURVES.

Degree of Curve	Velocity in Miles per Hour											
	10	15	20	25	30	35	40	45	50	55	60	65
0°30′	1/16″	1/16″	1/8″	3/16″	5/16″	3/8″	1/2″	11/16″	13/16″	1″	1 3/16″	1 3/8″
1	1/16	1/8	1/4	7/16	9/16	13/16	1 1/16	1 5/16	1 5/8	2	2 3/8	2 13/16
1 30	1/8	1/4	3/8	5/8	7/8	1 3/16	1 9/16	2	2 1/2	3	3 9/16	4 3/16
2	1/8	3/16	1/2	13/16	1 3/16	1 5/8	2 1/8	2 11/16	3 5/16	4	4 3/4	5 9/16
2 30	3/16	3/8	11/16	1	1 1/2	2	2 5/8	3 5/16	4 1/8	5	5 15/16	6 15/16
3	3/16	7/16	13/16	1 1/4	1 3/4	2 7/16	3 3/16	4	4 15/16	6	7 1/8	8 3/8
3 30	1/4	1/2	15/16	1 7/16	2 1/16	2 13/16	3 11/16	4 11/16	5 3/4	7	8 5/16	
4	1/4	9/16	1 1/16	1 5/8	2 3/8	3 1/4	4 1/4	5 5/16	6 5/8	8	9 1/2	
4 30	5/16	11/16	1 3/16	1 7/8	2 11/16	3 5/8	4 3/4	6	7 7/16	9		
5	5/16	3/4	1 5/16	2 1/16	2 15/16	4 1/16	5 1/4	6 11/16	8 1/4	10		
5 30	3/8	13/16	1 7/16	2 1/4	3 1/4	4 7/16	5 13/16	7 3/8	9 1/16			
6	3/8	7/8	1 9/16	2 1/2	3 9/16	4 7/8	6 5/16	8	9 7/8			
6 30	7/16	15/16	1 11/16	2 11/16	3 7/8	5 1/4	6 7/8	8 11/16				
7	7/16	1 1/16	1 7/8	2 7/8	4 1/8	5 5/8	7 3/8	9 3/8				
7 30	1/2	1 1/8	2	3 1/16	4 7/16	6 1/16	7 15/16					
8	1/2	1 3/16	2 1/8	3 5/16	4 3/4	6 7/16	8 7/16					
8 30	9/16	1 1/4	2 1/4	3 1/2	5 1/16	6 7/8	9					
9	9/16	1 5/16	2 3/8	3 11/16	5 5/16	7 1/4	9 1/2					
9 30	5/8	1 7/16	2 1/2	3 15/16	5 5/8	7 11/16						
10	11/16	1 1/2	2 5/8	4 1/8	5 15/16	8 1/16						
10 30	11/16	1 9/16	2 3/4	4 5/16	6 1/4	8 1/2						
11	3/4	1 5/8	2 7/8	4 9/16	6 1/2	8 7/8						
11 30	3/4	1 11/16	3 1/16	4 3/4	6 13/16	9 5/16						
12	13/16	1 3/4	3 3/16	4 15/16	7 1/8	9 11/16						
12 30	13/16	1 7/8	3 5/16	5 1/8	7 7/16							
13	7/8	1 15/16	3 7/16	5 3/8	7 11/16							
13 30	7/8	2	3 9/16	5 9/16	8							
14	15/16	2 1/16	3 11/16	5 3/4	8 5/16							
14 30	15/16	2 1/8	3 13/16	6	8 5/8							

TABLE XXVI.—INCHES IN DECIMALS OF A FOOT.

In.	0	1	2	3	4	5	6	7	8	9	10	11	In.
0	Feet	.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167	0
1/32	.0026	.0859	.1693	.2526	.3359	.4193	.5026	.5859	.6693	.7526	.8359	.9193	1/32
1/16	.0052	.0885	.1719	.2552	.3385	.4219	.5052	.5885	.6719	.7552	.8385	.9219	1/16
3/32	.0078	.0911	.1745	.2578	.3411	.4245	.5078	.5911	.6745	.7578	.8411	.9245	3/32
1/8	.0104	.0938	.1771	.2604	.3438	.4271	.5104	.5938	.6771	.7604	.8438	.9271	1/8
5/32	.0130	.0964	.1797	.2630	.3464	.4297	.5130	.5964	.6797	.7630	.8464	.9297	5/32
3/16	.0156	.0990	.1823	.2656	.3490	.4323	.5156	.5990	.6823	.7656	.8490	.9323	3/16
7/32	.0182	.1016	.1849	.2682	.3516	.4349	.5182	.6016	.6849	.7682	.8516	.9349	7/32
1/4	.0208	.1042	.1875	.2708	.3542	.4375	.5208	.6042	.6875	.7708	.8542	.9375	1/4
9/32	.0234	.1068	.1901	.2734	.3568	.4401	.5234	.6068	.6901	.7734	.8568	.9401	9/32
5/16	.0260	.1094	.1927	.2760	.3594	.4427	.5260	.6094	.6927	.7760	.8594	.9427	5/16
11/32	.0286	.1120	.1953	.2786	.3620	.4453	.5286	.6120	.6953	.7786	.8620	.9453	11/32
3/8	.0313	.1146	.1979	.2813	.3646	.4479	.5313	.6146	.6979	.7813	.8646	.9479	3/8
13/32	.0339	.1172	.2005	.2839	.3672	.4505	.5339	.6172	.7005	.7839	.8672	.9505	13/32
7/16	.0365	.1198	.2031	.2865	.3698	.4531	.5365	.6198	.7031	.7865	.8698	.9531	7/16
15/32	.0391	.1224	.2057	.2891	.3724	.4557	.5391	.6224	.7057	.7891	.8724	.9557	15/32
1/2	.0417	.1250	.2083	.2917	.3750	.4583	.5417	.6250	.7083	.7917	.8750	.9583	1/2
17/32	.0443	.1276	.2109	.2943	.3776	.4609	.5443	.6276	.7109	.7943	.8776	.9609	17/32
9/16	.0469	.1302	.2135	.2969	.3802	.4635	.5469	.6302	.7135	.7969	.8802	.9635	9/16
19/32	.0495	.1328	.2161	.2995	.3828	.4661	.5495	.6328	.7161	.7995	.8828	.9661	19/32
5/8	.0521	.1354	.2188	.3021	.3854	.4688	.5521	.6354	.7188	.8021	.8854	.9688	5/8
21/32	.0547	.1380	.2214	.3047	.3880	.4714	.5547	.6380	.7214	.8047	.8880	.9714	21/32
11/16	.0573	.1406	.2240	.3073	.3906	.4740	.5573	.6406	.7240	.8073	.8906	.9740	11/16
23/32	.0599	.1432	.2266	.3099	.3932	.4766	.5599	.6432	.7266	.8099	.8932	.9766	23/32
3/4	.0625	.1458	.2292	.3125	.3958	.4792	.5625	.6458	.7292	.8125	.8958	.9792	3/4
25/32	.0651	.1484	.2318	.3151	.3984	.4818	.5651	.6484	.7318	.8151	.8984	.9818	25/32
13/16	.0677	.1510	.2344	.3177	.4010	.4844	.5677	.6510	.7344	.8177	.9010	.9844	13/16
27/32	.0703	.1536	.2370	.3203	.4036	.4870	.5703	.6536	.7370	.8203	.9036	.9870	27/32
7/8	.0729	.1563	.2396	.3229	.4063	.4896	.5729	.6563	.7396	.8229	.9063	.9896	7/8
29/32	.0755	.1589	.2422	.3255	.4089	.4922	.5755	.6589	.7422	.8255	.9089	.9922	29/32
15/16	.0781	.1615	.2448	.3281	.4115	.4948	.5781	.6615	.7448	.8281	.9115	.9948	15/16
31/32	.0807	.1641	.2474	.3307	.4141	.4974	.5807	.6641	.7474	.8307	.9141	.9974	31/32
In.	0	1	2	3	4	5	6	7	8	9	10	11	In.

TABLE XXVII.—MIDDLE ORDINATES FOR CURVING RAILS.

Deg. of Curve	Length of Rail											Deg. of Curve
	20	22	24	26	27	28	29	30	33	45	60	
0°30′	1/16″	1/16″	1/16″	1/16″	1/8″	1/8″	1/8″	1/8″	1/8″	1/4″	1/2″	0°30′
1	1/8	1/8	1/8	3/16	3/16	3/16	1/4	1/4	5/16	1/2	15/16	1
1 30	3/16	3/16	1/4	1/4	5/16	5/16	5/16	3/8	7/16	13/16	1 7/16	1 30
2	3/16	1/4	5/16	3/8	3/8	7/16	7/16	1/2	9/16	1 1/16	1 7/8	2
2 30	1/4	5/16	3/8	7/16	1/2	1/2	9/16	9/16	11/16	1 5/16	2 3/8	2 30
3	5/16	3/8	7/16	1/2	9/16	5/8	11/16	11/16	7/8	1 9/16	2 13/16	3
3 30	3/8	7/16	1/2	5/8	11/16	11/16	3/4	13/16	1	1 7/8	3 5/16	3 30
4	7/16	1/2	5/8	11/16	3/4	13/16	7/8	15/16	1 1/8	2 1/8	3 3/4	4
4 30	1/2	9/16	11/16	13/16	7/8	15/16	1	1 1/16	1 5/16	2 3/8	4 1/4	4 30
5	1/2	5/8	3/4	7/8	15/16	1	1 1/8	1 3/16	1 7/16	2 5/8	4 11/16	5
5 30	9/16	11/16	13/16	1	1 1/16	1 1/8	1 3/16	1 5/16	1 9/16	2 15/16	5 3/16	5 30
6	5/8	3/4	7/8	1 1/16	1 1/8	1 1/4	1 5/16	1 7/16	1 11/16	3 3/16	5 5/8	6
6 30	11/16	13/16	1	1 1/8	1 1/4	1 5/16	1 7/16	1 9/16	1 7/8	3 7/16	6 1/8	6 30
7	3/4	7/8	1 1/16	1 1/4	1 5/16	1 7/16	1 9/16	1 5/8	2	3 11/16	6 5/8	7
7 30	13/16	15/16	1 1/8	1 5/16	1 7/16	1 9/16	1 5/8	1 3/4	2 1/8	4	7 1/16	7 30
8	13/16	1	1 3/16	1 7/16	1 1/2	1 5/8	1 3/4	1 7/8	2 1/4	4 1/4	7 9/16	8
8 30	7/8	1 1/16	1 5/16	1 1/2	1 5/8	1 3/4	1 7/8	2	2 7/16	4 1/2	8	8 30
9	15/16	1 1/8	1 3/8	1 9/16	1 11/16	1 7/8	2	2 1/8	2 9/16	4 3/4	8 1/2	9
9 30	1	1 3/16	1 7/16	1 11/16	1 13/16	1 15/16	2 1/16	2 1/4	2 11/16	5 1/16	8 15/16	9 30
10	1 1/16	1 1/4	1 1/2	1 3/4	1 15/16	2 1/16	2 3/16	2 3/8	2 7/8	5 5/16	9 7/16	10
10 30	1 1/8	1 5/16	1 9/16	1 7/8	2	2 1/8	2 5/16	2 1/2	3	5 9/16	9 7/8	10 30
11	1 1/8	1 3/8	1 11/16	1 15/16	2 1/8	2 1/4	2 7/16	2 9/16	3 1/8	5 13/16	10 3/8	11
11 30	1 3/16	1 7/16	1 3/4	2	2 3/16	2 3/8	2 9/16	2 11/16	3 1/4	6 1/8	10 13/16	11 30
12	1 1/4	1 1/2	1 13/16	2 1/8	2 5/16	2 7/16	2 5/8	2 13/16	3 7/16	6 3/8	11 5/16	12
12 30	1 5/16	1 9/16	1 7/8	2 3/16	2 3/8	2 9/16	2 3/4	2 15/16	3 9/16	6 5/8	11 3/4	12 30
13	1 3/8	1 5/8	1 15/16	2 5/16	2 1/2	2 11/16	2 7/8	3 1/16	3 11/16	6 7/8	12 1/4	13
13 30	1 7/16	1 11/16	2 1/16	2 3/8	2 9/16	2 3/4	3	3 3/16	3 7/8	7 1/8	12 3/4	13 30
14	1 7/16	1 3/4	2 1/8	2 1/2	2 11/16	2 7/8	3 1/16	3 5/16	4	7 7/16	13 3/16	14
14 30	1 1/2	1 13/16	2 3/16	2 9/16	2 3/4	3	3 3/16	3 7/16	4 1/8	7 11/16	13 11/16	14 30

TABLE XXVIII.—STADIA REDUCTIONS, HORIZONTAL & VERTICAL.

M.	0°		1°		2°		3°		4°		5°		6°		7°		8°		M.
	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	
0	100.00	.00	99.97	1.74	99.88	3.49	99.73	5.23	99.51	6.96	99.24	8.68	98.91	10.40	98.51	12.10	98.06	13.78	0
2	100.00	.06	99.97	1.80	99.87	3.55	99.72	5.28	99.51	7.02	99.23	8.74	98.90	10.45	98.50	12.15	98.05	13.84	2
4	100.00	.12	99.97	1.86	99.87	3.60	99.71	5.34	99.50	7.07	99.22	8.80	98.88	10.51	98.48	12.21	98.03	13.89	4
6	100.00	.17	99.96	1.92	99.87	3.66	99.71	5.40	99.49	7.13	99.21	8.85	98.87	10.57	98.47	12.26	98.01	13.95	6
8	100.00	.23	99.96	1.98	99.86	3.72	99.70	5.46	99.48	7.19	99.20	8.91	98.86	10.62	98.46	12.32	98.00	14.01	8
10	100.00	.29	99.96	2.04	99.86	3.78	99.69	5.52	99.47	7.25	99.19	8.97	98.85	10.68	98.44	12.38	97.98	14.06	10
12	100.00	.35	99.96	2.09	99.85	3.84	99.69	5.57	99.46	7.30	99.18	9.03	98.83	10.74	98.43	12.43	97.97	14.12	12
14	100.00	.41	99.95	2.15	99.85	3.90	99.68	5.63	99.46	7.36	99.17	9.08	98.82	10.79	98.41	12.49	97.95	14.17	14
16	100.00	.47	99.95	2.21	99.84	3.95	99.68	5.69	99.45	7.42	99.16	9.14	98.81	10.85	98.40	12.55	97.93	14.23	16
18	100.00	.52	99.95	2.27	99.84	4.01	99.67	5.75	99.44	7.48	99.15	9.20	98.80	10.91	98.39	12.60	97.92	14.28	18
20	100.00	.58	99.95	2.33	99.83	4.07	99.66	5.80	99.43	7.53	99.14	9.25	98.78	10.96	98.37	12.66	97.90	14.34	20
22	100.00	.64	99.94	2.38	99.83	4.13	99.66	5.86	99.42	7.59	99.13	9.31	98.77	11.02	98.36	12.72	97.88	14.40	22
24	100.00	.70	99.94	2.44	99.82	4.18	99.65	5.92	99.41	7.65	99.11	9.37	98.76	11.08	98.34	12.77	97.87	14.45	24
26	99.99	.76	99.94	2.50	99.82	4.24	99.64	5.98	99.40	7.71	99.10	9.43	98.74	11.13	98.33	12.83	97.85	14.51	26
28	99.99	.81	99.93	2.56	99.81	4.30	99.63	6.04	99.39	7.76	99.09	9.48	98.73	11.19	98.31	12.88	97.83	14.56	28
30	99.99	.87	99.93	2.62	99.81	4.36	99.63	6.09	99.38	7.82	99.08	9.54	98.72	11.25	98.29	12.94	97.82	14.62	30
32	99.99	.93	99.93	2.67	99.80	4.42	99.62	6.15	99.38	7.88	99.07	9.60	98.71	11.30	98.28	13.00	97.80	14.67	32
34	99.99	.99	99.93	2.73	99.80	4.48	99.62	6.21	99.37	7.94	99.06	9.65	98.69	11.36	98.27	13.05	97.78	14.73	34
36	99.99	1.05	99.92	2.79	99.79	4.53	99.61	6.27	99.36	7.99	99.05	9.71	98.68	11.42	98.25	13.11	97.76	14.79	36
38	99.99	1.11	99.92	2.85	99.79	4.59	99.60	6.33	99.35	8.05	99.04	9.77	98.67	11.47	98.24	13.17	97.75	14.84	38
40	99.99	1.16	99.92	2.91	99.78	4.65	99.59	6.38	99.34	8.11	99.03	9.83	98.65	11.53	98.22	13.22	97.73	14.90	40
42	99.99	1.22	99.91	2.97	99.78	4.71	99.59	6.44	99.33	8.17	99.01	9.88	98.64	11.59	98.20	13.28	97.71	14.95	42
44	99.98	1.28	99.91	3.02	99.77	4.76	99.58	6.50	99.32	8.22	99.00	9.94	98.63	11.64	98.19	13.33	97.69	15.01	44
46	99.98	1.34	99.90	3.08	99.77	4.82	99.57	6.56	99.31	8.28	98.99	10.00	98.61	11.70	98.17	13.39	97.68	15.06	46
48	99.98	1.40	99.90	3.14	99.76	4.88	99.56	6.61	99.30	8.34	98.98	10.05	98.60	11.76	98.16	13.45	97.66	15.12	48
50	99.98	1.45	99.90	3.20	99.76	4.94	99.56	6.67	99.29	8.40	98.97	10.11	98.58	11.81	98.14	13.50	97.64	15.17	50
52	99.98	1.51	99.89	3.26	99.75	4.99	99.55	6.73	99.28	8.45	98.96	10.17	98.57	11.87	98.13	13.56	97.62	15.23	52
54	99.98	1.57	99.89	3.31	99.74	5.05	99.54	6.78	99.27	8.51	98.94	10.22	98.56	11.93	98.11	13.61	97.61	15.28	54
56	99.97	1.63	99.89	3.37	99.74	5.11	99.53	6.84	99.26	8.57	98.93	10.28	98.54	11.98	98.10	13.67	97.59	15.34	56
58	99.97	1.69	99.88	3.43	99.73	5.17	99.52	6.90	99.25	8.63	98.92	10.34	98.53	12.04	98.08	13.73	97.57	15.40	58
60	99.97	1.74	99.88	3.49	99.73	5.23	99.51	6.96	99.24	8.68	98.91	10.40	98.51	12.10	98.06	13.78	97.55	15.45	60
.75	.75	.01	.75	.02	.75	.03	.75	.05	.75	.06	.75	.07	.75	.08	.74	.10	.74	.11	.75
1.00	1.00	.01	1.00	.03	1.00	.04	1.00	.06	1.00	.08	.99	.09	.99	.11	.99	.13	.99	.15	1.00
1.25	1.25	.02	1.25	.03	1.25	.05	1.25	.08	1.25	.10	1.24	.11	1.24	.14	1.24	.16	1.23	.18	1.25
c																			c

TABLE XXVIII.—STADIA REDUCTIONS, HORIZONTAL & VERTICAL

M.	9°		10°		11°		12°		13°		14°		15°		16°		17°		M.
	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	Hor.	Vert.	
0	97.55	15.45	96.98	17.10	96.36	18.73	95.68	20.34	94.94	21.92	94.15	23.47	93.30	25.00	92.40	26.50	91.45	27.96	0
2	97.53	15.51	96.96	17.16	96.34	18.78	95.65	20.39	94.91	21.97	94.12	23.52	93.27	25.05	92.37	26.55	91.42	28.01	2
4	97.52	15.56	96.94	17.21	96.32	18.84	95.63	20.44	94.89	22.02	94.09	23.58	93.24	25.10	92.34	26.59	91.39	28.06	4
6	97.50	15.62	96.92	17.26	96.29	18.89	95.61	20.50	94.86	22.08	94.07	23.63	93.21	25.15	92.31	26.64	91.35	28.10	6
8	97.48	15.67	96.90	17.32	96.27	18.95	95.58	20.55	94.84	22.13	94.04	23.68	93.18	25.20	92.28	26.69	91.32	28.15	8
10	97.46	15.73	96.88	17.37	96.25	19.00	95.56	20.60	94.81	22.18	94.01	23.73	93.16	25.25	92.25	26.74	91.29	28.20	10
12	97.44	15.78	96.86	17.43	96.23	19.05	95.53	20.66	94.79	22.23	93.98	23.78	93.13	25.30	92.22	26.79	91.26	28.25	12
14	97.43	15.84	96.84	17.48	96.21	19.11	95.51	20.71	94.76	22.28	93.95	23.83	93.10	25.35	92.19	26.84	91.22	28.30	14
16	97.41	15.89	96.82	17.54	96.18	19.16	95.49	20.76	94.73	22.34	93.93	23.88	93.07	25.40	92.15	26.89	91.19	28.34	16
18	97.39	15.95	96.80	17.59	96.16	19.21	95.46	20.81	94.71	22.39	93.90	23.93	93.04	25.45	92.12	26.94	91.16	28.39	18
20	97.37	16.00	96.78	17.65	96.14	19.27	95.44	20.87	94.68	22.44	93.87	23.99	93.01	25.50	92.09	26.99	91.12	28.44	20
22	97.35	16.06	96.76	17.70	96.12	19.32	95.41	20.92	94.66	22.49	93.84	24.04	92.98	25.55	92.06	27.04	91.09	28.49	22
24	97.33	16.11	96.74	17.76	96.09	19.38	95.39	20.97	94.63	22.54	93.81	24.09	92.95	25.60	92.03	27.09	91.06	28.54	24
26	97.31	16.17	96.72	17.81	96.07	19.43	95.36	21.03	94.60	22.60	93.79	24.14	92.92	25.65	92.00	27.13	91.02	28.58	26
28	97.29	16.22	96.70	17.86	96.05	19.48	95.34	21.08	94.58	22.65	93.76	24.19	92.89	25.70	91.97	27.18	90.99	28.63	28
30	97.28	16.28	96.68	17.92	96.03	19.54	95.32	21.13	94.55	22.70	93.73	24.24	92.86	25.75	91.93	27.23	90.96	28.68	30
32	97.26	16.33	96.66	17.97	96.00	19.59	95.29	21.18	94.52	22.75	93.70	24.29	92.83	25.80	91.90	27.28	90.92	28.73	32
34	97.24	16.39	96.64	18.03	95.98	19.64	95.27	21.24	94.50	22.80	93.67	24.34	92.80	25.85	91.87	27.33	90.89	28.77	34
36	97.22	16.44	96.62	18.08	95.96	19.70	95.24	21.29	94.47	22.85	93.65	24.39	92.77	25.90	91.84	27.38	90.86	28.82	36
38	97.20	16.50	96.60	18.14	95.93	19.75	95.22	21.34	94.44	22.91	93.62	24.44	92.74	25.95	91.81	27.43	90.82	28.87	38
40	97.18	16.55	96.57	18.19	95.91	19.80	95.19	21.39	94.42	22.96	93.59	24.49	92.71	26.00	91.77	27.48	90.79	28.92	40
42	97.16	16.61	96.55	18.24	95.89	19.86	95.17	21.45	94.39	23.01	93.56	24.55	92.68	26.05	91.74	27.52	90.76	28.96	42
44	97.14	16.66	96.53	18.30	95.86	19.91	95.14	21.50	94.36	23.06	93.53	24.60	92.65	26.10	91.71	27.57	90.72	29.01	44
46	97.12	16.72	96.51	18.35	95.84	19.96	95.12	21.55	94.34	23.11	93.50	24.65	92.62	26.15	91.68	27.62	90.69	29.06	46
48	97.10	16.77	96.49	18.41	95.82	20.02	95.09	21.60	94.31	23.16	93.47	24.70	92.59	26.20	91.65	27.67	90.66	29.11	48
50	97.08	16.83	96.47	18.46	95.79	20.07	95.07	21.66	94.28	23.22	93.45	24.75	92.56	26.25	91.61	27.72	90.62	29.15	50
52	97.06	16.88	96.45	18.51	95.77	20.12	95.04	21.71	94.26	23.27	93.42	24.80	92.53	26.30	91.58	27.77	90.59	29.20	52
54	97.04	16.94	96.42	18.57	95.75	20.18	95.02	21.76	94.23	23.32	93.39	24.85	92.49	26.35	91.55	27.81	90.55	29.25	54
56	97.02	16.99	96.40	18.62	95.72	20.23	94.99	21.81	94.20	23.37	93.36	24.90	92.46	26.40	91.52	27.86	90.52	29.30	56
58	97.00	17.05	96.38	18.68	95.70	20.28	94.97	21.87	94.17	23.42	93.33	24.95	92.43	26.45	91.48	27.91	90.48	29.34	58
60	96.98	17.10	96.36	18.73	95.68	20.34	94.94	21.92	94.15	23.47	93.30	25.00	92.40	26.50	91.45	27.96	90.45	29.39	60
.75	.74	.12	.74	.14	.73	.15	.73	.16	.73	.17	.73	.19	.72	.20	.72	.21	.72	.23	.75
1.00	.99	.16	.98	.18	.98	.20	.98	.22	.97	.23	.97	.25	.96	.27	.96	.28	.95	.30	1.00
1.25	1.23	.21	1.23	.23	1.22	.25	1.22	.27	1.21	.29	1.21	.31	1.20	.34	1.20	.36	1.19	.38	1.25

TABLE XXVIII.—STADIA REDUCTIONS, HORIZONTAL & VERTICAL.

M.	18° Hor.	18° Vert.	19° Hor.	19° Vert.	20° Hor.	20° Vert.	21° Hor.	21° Vert.	22° Hor.	22° Vert.	23° Hor.	23° Vert.	24° Hor.	24° Vert.	25° Hor.	25° Vert.	26° Hor.	26° Vert.	M.
0	90.45	29.39	89.40	30.78	88.30	32.14	87.16	33.46	85.97	34.73	84.73	35.97	83.46	37.16	82.14	38.30	80.78	39.40	0
2	90.42	29.44	89.36	30.83	88.26	32.18	87.12	33.50	85.93	34.77	84.69	36.01	83.41	37.20	82.09	38.34	80.74	39.44	2
4	90.38	29.48	89.33	30.87	88.23	32.23	87.08	33.54	85.89	34.82	84.65	36.05	83.37	37.23	82.05	38.38	80.69	39.47	4
6	90.35	29.53	89.29	30.92	88.19	32.27	87.04	33.59	85.85	34.86	84.61	36.09	83.33	37.27	82.01	38.41	80.65	39.51	6
8	90.31	29.58	89.26	30.97	88.15	32.32	87.00	33.63	85.80	34.90	84.57	36.13	83.28	37.31	81.96	38.45	80.60	39.54	8
10	90.28	29.62	89.22	31.01	88.11	32.36	86.96	33.67	85.76	34.94	84.52	36.17	83.24	37.35	81.92	38.49	80.55	39.58	10
12	90.24	29.67	89.18	31.06	88.08	32.41	86.92	33.72	85.72	34.98	84.48	36.21	83.20	37.39	81.87	38.53	80.51	39.61	12
14	90.21	29.72	89.15	31.10	88.04	32.45	86.88	33.76	85.68	35.02	84.44	36.25	83.15	37.43	81.83	38.56	80.46	39.65	14
16	90.18	29.76	89.11	31.15	88.00	32.49	86.84	33.80	85.64	35.07	84.40	36.29	83.11	37.47	81.78	38.60	80.41	39.69	16
18	90.14	29.81	89.08	31.19	87.96	32.54	86.80	33.84	85.60	35.11	84.35	36.33	83.07	37.51	81.74	38.64	80.37	39.72	18
20	90.11	29.86	89.04	31.24	87.93	32.58	86.77	33.89	85.56	35.15	84.31	36.37	83.02	37.54	81.69	38.67	80.32	39.76	20
22	90.07	29.90	89.00	31.28	87.89	32.63	86.73	33.93	85.52	35.19	84.27	36.41	82.98	37.58	81.65	38.71	80.28	39.79	22
24	90.04	29.95	88.96	31.33	87.85	32.67	86.69	33.97	85.48	35.23	84.23	36.45	82.93	37.62	81.60	38.75	80.23	39.83	24
26	90.00	30.00	88.93	31.38	87.81	32.72	86.65	34.01	85.44	35.27	84.18	36.49	82.89	37.66	81.56	38.78	80.18	39.86	26
28	89.97	30.04	88.89	31.42	87.77	32.76	86.61	34.06	85.40	35.31	84.14	36.53	82.85	37.70	81.51	38.82	80.14	39.90	28
30	89.93	30.09	88.86	31.47	87.74	32.80	86.57	34.10	85.36	35.36	84.10	36.57	82.80	37.74	81.47	38.86	80.09	39.93	30
32	89.90	30.14	88.82	31.51	87.70	32.85	86.53	34.14	85.31	35.40	84.06	36.61	82.76	37.77	81.42	38.89	80.04	39.97	32
34	89.86	30.19	88.78	31.56	87.66	32.89	86.49	34.18	85.27	35.44	84.01	36.65	82.72	37.81	81.38	38.93	80.00	40.00	34
36	89.83	30.23	88.75	31.60	87.62	32.93	86.45	34.23	85.23	35.48	83.97	36.69	82.67	37.85	81.33	38.97	79.95	40.04	36
38	89.79	30.28	88.71	31.65	87.58	32.98	86.41	34.27	85.19	35.52	83.93	36.73	82.63	37.89	81.28	39.00	79.90	40.07	38
40	89.76	30.32	88.67	31.69	87.54	33.02	86.37	34.31	85.15	35.56	83.89	36.77	82.58	37.93	81.24	39.04	79.86	40.11	40
42	89.72	30.37	88.64	31.74	87.51	33.07	86.33	34.35	85.11	35.60	83.84	36.80	82.54	37.96	81.19	39.08	79.81	40.14	42
44	89.69	30.41	88.60	31.78	87.47	33.11	86.29	34.40	85.07	35.64	83.80	36.84	82.49	38.00	81.15	39.11	79.76	40.18	44
46	89.65	30.46	88.56	31.83	87.43	33.15	86.25	34.44	85.02	35.68	83.76	36.88	82.45	38.04	81.10	39.15	79.72	40.21	46
48	89.61	30.51	88.53	31.87	87.39	33.20	86.21	34.48	84.98	35.72	83.72	36.92	82.41	38.08	81.06	39.18	79.67	40.24	48
50	89.58	30.55	88.49	31.92	87.35	33.24	86.17	34.52	84.94	35.76	83.67	36.96	82.36	38.11	81.01	39.22	79.62	40.28	50
52	89.54	30.60	88.45	31.96	87.31	33.28	86.13	34.57	84.90	35.80	83.63	37.00	82.32	38.15	80.97	39.26	79.58	40.31	52
54	89.51	30.65	88.41	32.01	87.27	33.33	86.09	34.61	84.86	35.85	83.59	37.04	82.27	38.19	80.92	39.29	79.53	40.35	54
56	89.47	30.69	88.38	32.05	87.24	33.37	86.05	34.65	84.82	35.89	83.54	37.08	82.23	38.23	80.87	39.33	79.48	40.38	56
58	89.44	30.74	88.34	32.09	87.20	33.41	86.01	34.69	84.77	35.93	83.50	37.12	82.18	38.26	80.83	39.36	79.44	40.42	58
60	89.40	30.78	88.30	32.14	87.16	33.46	85.97	34.73	84.73	35.97	83.46	37.16	82.14	38.30	80.78	39.40	79.39	40.45	60
.75	.71	.24	.71	.25	.70	.26	.70	.27	.69	.29	.69	.30	.68	.31	.68	.32	.67	.33	.75
1.00	.95	.32	.94	.33	.94	.35	.93	.37	.92	.38	.92	.40	.91	.41	.90	.43	.89	.45	1.00
1.25 *c*	1.19	.40	1.18	.42	1.17	.44	1.16	.46	1.15	.48	1.15	.50	1.14	.52	1.13	.54	1.12	.56	1.25 *c*

TABLE XXIX.—MEAN REFRACTIONS IN DECLINATION.

Latitude.	Hour Ang.	DECLINATIONS.								
		+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°
2°30′	0 h	−18″	−12″	−07″	−02″	02″	07″	12″	18″	23″
	2	−18	−12	−07	−02	02	07	12	18	23
	3	−17	−11	−06	−01	03	08	13	19	25
	4	−15	−10	−05	00	05	10	15	21	27
	5	−10	−05	00	+05	10	15	20	26	32
5°	0 h	−15″	−10″	−05″	00″	05″	10″	15″	20″	27″
	2	−15	−10	−05	00	05	10	15	20	27
	3	−13	−08	−03	+02	07	12	17	23	29
	4	−10	−05	00	+05	10	15	20	27	32
	5	−05	00	+05	+10	15	20	27	32	40
7°30′	0 h	−13″	−08″	−02″	02″	08″	13″	18″	24″	29″
	2	−12	−07	−01	03	09	14	19	25	31
	3	−10	−05	00	05	10	15	20	26	32
	4	−05	00	+05	10	15	20	26	32	39
	5	+07	+12	+17	23	29	36	43	51	1′01
10°	0 h	−10″	−05″	00″	05″	10″	15″	20″	26″	32″
	2	−07	−03	02	07	12	17	22	28	34
	3	−05	00	03	08	13	19	25	31	38
	4	00	+05	10	15	20	26	32	39	46
	5	+15	+20	26	32	39	46	55	1′06	1′19
12°30′	0 h	−08″	−02″	02″	08″	13″	18″	24″	30″	36″
	2	−06	00	05	10	15	20	26	32	39
	3	+02	+07	12	17	23	29	36	43	51
	4	+04	+09	14	20	25	31	40	48	55
	5	+21	+27	33	40	48	57	1′08	1′23	1′41
15°	0 h	−05″	00″	05″	10″	15″	21″	27″	33″	40″
	2	−03	02	07	12	18	23	29	36	43
	3	+01	05	11	16	22	28	34	41	49
	4	+08	12	19	24	30	37	44	53	1′04
	5	+29	34	41	49	59	1′10	1′24	1′43	2 08
17°30′	0 h	−02″	02″	08″	13″	18″	24″	30″	36″	44″
	2	00	05	10	15	21	27	33	40	48
	3	+02	10	15	21	27	33	40	48	57
	4	+13	18	23	29	35	43	51	1′01	1′13
	5	+34	41	49	58	1′10	1′23	1′41	2 06	2 42
20°	0 h	00″	05″	10″	15″	21″	27″	33″	40″	48″
	2	03	07	13	18	24	30	36	44	52
	3	06	13	18	24	30	36	44	52	1′02
	4	17	22	28	35	42	50	1′00	1′11	1 26
	5	39	47	57	1′07	1′20	1′37	2 00	2 32	3 25
22°30′	0 h	02″	08″	13″	18″	24″	30″	36″	44″	52″
	2	06	11	15	21	27	33	40	48	57
	3	11	15	21	27	33	40	48	57	1′08
	4	20	26	32	39	46	56	1′07	1′19	1 37
	5	45	53	1′03	1′16	1′31	1′52	2 21	3 07	4 28
25°	0 h	05″	10″	15″	21″	27″	33″	40″	48″	57″
	2	08	14	19	25	31	38	46	54	1′05
	3	12	18	24	30	37	44	53	1′04	1 18
	4	23	29	35	45	53	1′03	1′16	1 31	1 52
	5	49	59	1′10	1′24	1′52	2 07	2 44	3 46	5 43
		+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°

TABLE XXIX.—MEAN REFRACTIONS IN DECLINATION.

Latitude.	Hour Ang.	DECLINATIONS.								
		+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°
27° 30′	0h	08″	13″	18″	24″	30″	36″	44″	52″	1′ 02″
	2	11	16	22	28	34	41	49	1′ 00	1 10
	3	17	22	28	35	42	50	1′ 00	1 11	1 26
	4	28	35	42	50	1′ 00	1′ 11	1 26	1 43	2 09
	5	54	1′ 05	1′ 18	1′ 34	1 54	2 24	3 11	4 38	8 15
30°	0h	10″	15″	21″	27″	33″	40″	48″	57″	1′ 08″
	2	14	19	25	31	38	46	54	1′ 05	1 18
	3	20	26	32	39	47	55	1′ 06	1 19	1 36
	4	32	39	46	52	1′ 06	1′ 19	1 35	1 57	2 29
	5	1′ 00	1′ 10	1′ 24	1′ 52	2 07	2 44	3 46	5 43	13 06
32° 30′	0h	13″	18″	24″	30″	36″	44″	52″	1′ 02″	1′ 14″
	2	17	22	28	35	42	50	1′ 00	1 11	1 26
	3	23	29	35	43	51	1′ 01	1 13	1 28	1 47
	4	35	43	51	1′ 01	1′ 13	1 27	1 46	2 13	2 54
	5	1′ 03	1′ 15	1′ 31	1 53	2 20	3 05	4 25	7 36	
35°	0h	15″	21″	27″	33″	40″	48″	57″	1′ 08″	1′ 21″
	2	20	25	32	38	46	55	1′ 05	1 18	1 35
	3	26	33	39	47	56	1′ 07	1 21	1 38	2 00
	4	39	47	56	1′ 07	1′ 20	1 36	1 59	2 32	3 25
	5	1′ 07	1′ 20	1′ 38	2 00	2 34	3 29	5 14	10 16	
37° 30′	0h	18″	24″	30″	36″	44″	52″	1′ 02″	1′ 14″	1′ 29″
	2	22	28	35	42	50	1′ 00	1 12	1 26	1 45
	3	29	36	43	52	1′ 02	1 14	1 29	1 49	2 16
	4	43	51	1′ 01	1′ 13	1 27	1 49	2 14	2 54	4 05
	5	1′ 11	1′ 26	1 54	2 10	2 49	3 55	6 15	14 58	
40°	0h	21″	27″	33″	40″	48″	57″	1′ 08″	1′ 21″	1′ 39″
	2	25	32	39	46	52	1′ 06	1 19	1 35	1 57
	3	33	40	48	57	1′ 08	1 21	1 38	2 02	2 36
	4	47	55	1′ 06	1′ 19	1 36	1 58	2 30	3 21	4 59
	5	1′ 15	1′ 31	1 51	2 20	3 05	4 25	7 34	25 18	
42° 30′	0h	24″	30″	36″	44″	52″	1′ 02″	1′ 14″	1′ 29″	1′ 49″
	2	28	35	39	50	1′ 00	1 12	1 26	1 45	2 11
	3	36	43	52	1′ 02	1 13	1 29	1 49	2 17	2 59
	4	50	1′ 00	1′ 11	1 26	1 44	2 10	2 49	3 55	6 16
	5	1′ 19	1 36	1 58	2 30	3 22	5 00	9 24		
45°	0h	27″	33″	40″	48″	57″	1′ 08″	1′ 21″	1′ 39″	2′ 02″
	2	32	39	46	52	1′ 06	1 19	1 35	1 57	2 29
	3	40	47	56	1′ 07	1 21	1 38	2 00	2 34	3 29
	4	54	1′ 04	1′ 16	1 33	1 54	2 24	3 11	4 38	8 15
	5	1′ 23	1 41	2 05	2 41	3 40	5 40	12 02		
47° 30′	0h	30″	36″	44″	52″	1′ 02″	1′ 14″	1′ 29″	1′ 49″	2′ 18″
	2	35	42	50	1′ 00	1 12	1 26	1 45	2 01	2 51
	3	43	51	1′ 01	1 13	1 28	1 47	2 15	2 56	4 08
	4	56	1′ 09	1 23	1 40	2 05	2 40	3 39	5 37	11 18
	5	1′ 27	1 46	2 12	2 52	4 01	6 30	16 19		
		+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°

TABLE XXIX.—MEAN REFRACTIONS IN DECLINATION.

Latitude.	Hour Ang.	DECLINATIONS.								
		+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°
50°	0 h	33″	40″	48″	57″	1′ 08″	1′ 21″	1′ 39″	2′ 02″	2′ 36″
	2	38	46	55	1′ 06	1 18	1 35	1 57	2 28	3 19
	3	47	56	1′ 06	1 19	1 36	2 29	2 31	3 23	5 02
	4	1′ 02	1′ 14	1 29	1 48	2 16	2 58	4 18	6 59	19 47
	5	1 30	1 51	2 19	3 04	4 22	7 28	24 10		
52° 30′	0 h	36″	44″	52″	1′ 02″	1′ 14″	1′ 29″	1′ 49″	2′ 18″	3′ 05″
	2	43	50	59	1 11	1 26	1 42	2 23	2 49	3 55
	3	50	1′ 00	1′ 11	1 26	1 45	2 11	2 51	2 58	6 22
	4	1′ 05	1 18	1 35	2 10	2 28	3 19	4 53	8 42	
	5	1 34	1 56	2 27	3 16	4 47	8 52			
55°	0 h	40″	48″	57″	1′ 08″	1′ 21″	1′ 39″	2′ 02″	2′ 36″	3′ 33″
	2	46	55	1′ 05	1 18	1 34	1 56	2 30	3 15	4 47
	3	55	1′ 06	1 19	1 35	1 58	2 30	3 21	4 58	9 19
	4	1′ 10	1 23	1 42	2 06	2 43	3 44	5 49	12 41	
	5	1 37	2 01	2 34	3 28	5 15	10 18			
57° 30′	0 h	44″	52″	1′ 02″	1′ 14″	1′ 29″	1′ 49″	2′ 18″	3′ 05″	4 37″
	2	50	59	1 11	1 25	1 43	2 09	2 47	3 51	6 04
	3	58	1′ 10	1 24	1 42	2 07	2 43	3 45	5 50	12 47
	4	1′ 11	1 25	1 43	2 10	2 50	3 55	6 14	14 49	
	5	1 41	2 06	2 42	3 42	5 46	12 26			
60°	0 h	48″	57″	1′ 08″	1′ 21″	1′ 39″	2′ 02″	2′ 36″	3′ 33″	5′ 23″
	2	54	1′ 04	1 17	1 33	1 54	2 24	3 12	4 38	8 15
	3	1′ 03	1 15	1 30	1 51	2 20	3 04	4 24	7 31	24 44
	4	1 18	1 34	1 56	2 28	3 18	4 50	8 53		
	5	1 45	2 11	2 50	3 57	6 21	15 32			
62° 30′	0 h	52″	1′ 02″	1′ 14″	1′ 29″	1′ 50″	2′ 18″	3′ 00″	4′ 17″	7′ 13″
	2	58	1 09	1 23	1 41	2 06	2 43	3 44	5 50	12 44
	3	1′ 07	1 23	1 38	2 01	2 35	3 30	5 16	10 24	
	4	1 23	1 40	2 05	2 40	3 40	5 37	11 50		
	5	1 48	2 17	2 59	4 14	7 03				
65°	0 h	57″	1′ 08″	1′ 21″	1′ 39″	2′ 02″	2′ 36″	3′ 33″	5′ 23″	10′ 51″
	2	1′ 03	1 16	1 31	1 52	2 21	3 07	4 28	7 44	
	3	1 12	1 27	1 46	2 12	2 52	4 02	6 33		
	4	1 27	1 47	2 13	2 54	4 05	6 40			
	5	1 52	2 22	3 08	4 30	7 52				
67° 30′	0 h	1′ 02″	1′ 14″	1′ 29″	1′ 50″	2′ 18″	3′ 00″	4′ 17″	7′ 13″	
	2	1 08	1 22	1 40	2 03	2 39	3 37	5 32	11 28	
	3	1 17	1 34	1 55	2 26	3 14	4 44	8 34		
	4	1 32	1 53	2 23	3 14	4 35	8 05			
	5	1 56	2 28	3 17	4 40	8 51				
70°	0 h	1′ 08″	1′ 21″	1′ 39″	2′ 02″	2′ 36″	3′ 33″	5′ 23″	10′ 51″	
	2	1 14	1 29	1 50	2 18	3 00	4 17	7 13		
	3	1 23	1 43	2 05	2 41	3 41	5 59	12 15		
	4	1 37	2 00	2 34	3 28	5 20	10 12			
	5	2 02	2 33	3 27	5 11	10 05				
		+20°	+15°	+10°	+5°	0°	−5°	−10°	−15°	−20°

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
0.1	.09	.19	.28	.37	.46	.56	.65	.74	.83	0.1
.2	.19	.37	.56	.74	.93	1.11	1.30	1.48	1.67	.2
.3	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	.3
.4	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	.4
0.5	.46	.93	1.39	1.85	2.31	2.78	3.24	3.70	4.17	0.5
.6	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	.6
.7	.65	1.30	1.94	2.59	3.24	3.89	4.54	5.19	5.83	.7
.8	.74	1.48	2.22	2.96	3.70	4.44	5.19	5.93	6.67	.8
.9	.83	1.67	2.50	3.33	4.17	5.00	5.83	6.67	7.50	.9
1.0	.93	1.85	2.78	3.70	4.63	5.56	6.48	7.41	8.33	1.0
.1	1.02	2.04	3.06	4.07	5.09	6.11	7.13	8.15	9.17	.1
.2	1.11	2.22	3.33	4.44	5.56	6.67	7.78	8.89	10.00	.2
.3	1.20	2.41	3.61	4.81	6.02	7.22	8.43	9.63	10.83	.3
.4	1.30	2.59	3.89	5.19	6.48	7.78	9.07	10.37	11.67	.4
1.5	1.39	2.78	4.17	5.56	6.94	8.33	9.72	11.11	12.50	1.5
.6	1.48	2.96	4.44	5.93	7.41	8.89	10.37	11.85	13.33	.6
.7	1.57	3.15	4.72	6.30	7.87	9.44	11.02	12.59	14.17	.7
.8	1.67	3.33	5.00	6.67	8.33	10.00	11.67	13.33	15.00	.8
.9	1.76	3.52	5.28	7.04	8.80	10.56	12.31	14.07	15.83	.9
2.0	1.85	3.70	5.56	7.41	9.26	11.11	12.96	14.81	16.67	2.0
.1	1.94	3.89	5.83	7.78	9.72	11.67	13.61	15.56	17.50	.1
.2	2.04	4.07	6.11	8.15	10.19	12.22	14.26	16.30	18.33	.2
.3	2.13	4.26	6.39	8.52	10.65	12.78	14.91	17.04	19.17	.3
.4	2.22	4.44	6.67	8.89	11.11	13.33	15.56	17.78	20.00	.4
2.5	2.31	4.63	6.94	9.26	11.57	13.89	16.20	18.52	20.83	2.5
.6	2.41	4.81	7.22	9.63	12.04	14.44	16.85	19.26	21.67	.6
.7	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	22.50	.7
.8	2.59	5.19	7.78	10.37	12.96	15.56	18.15	20.74	23.33	.8
.9	2.69	5.37	8.06	10.74	13.43	16.11	18.80	21.48	24.17	.9
3.0	2.78	5.56	8.33	11.11	13.89	16.67	19.44	22.22	25.00	3.0
.1	2.87	5.74	8.61	11.48	14.35	17.22	20.09	22.96	25.83	.1
.2	2.96	5.93	8.89	11.85	14.81	17.78	20.74	23.70	26.67	.2
.3	3.06	6.11	9.17	12.22	15.28	18.33	21.39	24.44	27.50	.3
.4	3.15	6.30	9.44	12.59	15.74	18.89	22.04	25.19	28.33	.4
3.5	3.24	6.48	9.72	12.96	16.20	19.44	22.69	25.93	29.17	3.5
.6	3.33	6.67	10.00	13.33	16.67	20.00	23.33	26.67	30.00	.6
.7	3.43	6.85	10.28	13.70	17.13	20.56	23.98	27.41	30.83	.7
.8	3.52	7.04	10.56	14.07	17.59	21.11	24.63	28.15	31.67	.8
.9	3.61	7.22	10.83	14.44	18.06	21.67	25.28	28.89	32.50	.9
4.0	3.70	7.41	11.11	14.81	18.52	22.22	25.93	29.63	33.33	4.0
.1	3.80	7.59	11.39	15.19	18.98	22.78	26.57	30.37	34.17	.1
.2	3.89	7.78	11.67	15.56	19.44	23.33	27.22	31.11	35.00	.2
.3	3.98	7.96	11.94	15.93	19.91	23.89	27.87	31.85	35.83	.3
.4	4.07	8.15	12.22	16.30	20.37	24.44	28.52	32.59	36.67	.4
4.5	4.17	8.33	12.50	16.67	20.83	25.00	29.17	33.33	37.50	4.5
.6	4.26	8.52	12.78	17.04	21.30	25.56	29.81	34.07	38.33	.6
.7	4.35	8.70	13.06	17.41	21.76	26.11	30.46	34.81	39.17	.7
.8	4.44	8.89	13.33	17.78	22.22	26.67	31.11	35.56	40.00	.8
.9	4.54	9.07	13.61	18.15	22.69	27.22	31.76	36.30	40.83	.9
5.0	4.63	9.26	13.89	18.52	23.15	27.78	32.41	37.04	41.67	5.0
.1	4.72	9.44	14.17	18.89	23.61	28.33	33.06	37.78	42.50	.1
.2	4.81	9.63	14.44	19.26	24.07	28.89	33.70	38.52	43.33	.2
.3	4.91	9.81	14.72	19.63	24.54	29.44	34.35	39.26	44.17	.3
.4	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	.4
5.5	5.09	10.19	15.28	20.37	25.46	30.56	35.65	40.74	45.83	5.5
.6	5.19	10.37	15.56	20.74	25.93	31.11	36.30	41.48	46.67	.6
.7	5.28	10.56	15.83	21.11	26.39	31.67	36.94	42.22	47.50	.7
.8	5.37	10.74	16.11	21.48	26.85	32.22	37.59	42.96	48.33	.8
.9	5.46	10.93	16.39	21.85	27.31	32.78	38.24	43.70	49.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
6.0	5.56	11.11	16.67	22.22	27.78	33.33	38.89	44.44	50.00	6.0
.1	5.65	11.30	16.94	22.59	28.24	33.89	39.54	45.19	50.83	.1
.2	5.74	11.48	17.22	22.96	28.70	34.44	40.19	45.93	51.67	.2
.3	5.83	11.67	17.50	23.33	29.17	35.00	40.83	46.67	52.50	.3
.4	5.93	11.85	17.78	23.70	29.63	35.56	41.48	47.41	53.33	.4
6.5	6.02	12.04	18.06	24.07	30.09	36.11	42.13	48.15	54.17	6.5
.6	6.11	12.22	18.33	24.44	30.56	36.67	42.78	48.89	55.00	.6
.7	6.20	12.41	18.61	24.81	31.02	37.22	43.43	49.63	55.83	.7
.8	6.30	12.59	18.89	25.19	31.48	37.78	44.07	50.37	56.67	.8
.9	6.39	12.78	19.17	25.56	31.94	38.33	44.72	51.11	57.50	.9
7.0	6.48	12.96	19.44	25.93	32.41	38.89	45.37	51.85	58.33	7.0
.1	6.57	13.15	19.72	26.30	32.87	39.44	46.02	52.59	59.17	.1
.2	6.67	13.33	20.00	26.67	33.33	40.00	46.67	53.33	60.00	.2
.3	6.76	13.52	20.28	27.04	33.80	40.56	47.31	54.07	60.83	.3
.4	6.85	13.70	20.56	27.41	34.26	41.11	47.96	54.81	61.67	.4
7.5	6.94	13.89	20.83	27.78	34.72	41.67	48.61	55.56	62.50	7.5
.6	7.04	14.07	21.11	28.15	35.19	42.22	49.26	56.30	63.33	.6
.7	7.13	14.26	21.39	28.52	35.65	42.78	49.91	57.04	64.17	.7
.8	7.22	14.44	21.67	28.89	36.11	43.33	50.56	57.78	65.00	.8
.9	7.31	14.63	21.94	29.26	36.57	43.89	51.20	58.52	65.83	.9
8.0	7.41	14.81	22.22	29.63	37.04	44.44	51.85	59.26	66.67	8.0
.1	7.50	15.00	22.50	30.00	37.50	45.00	52.50	60.00	67.50	.1
.2	7.59	15.19	22.78	30.37	37.96	45.56	53.15	60.74	68.33	.2
.3	7.69	15.37	23.06	30.74	38.43	46.11	53.80	61.48	69.17	.3
.4	7.78	15.56	23.33	31.11	38.89	46.67	54.44	62.22	70.00	.4
8.5	7.87	15.74	23.61	31.48	39.35	47.22	55.09	62.96	70.83	8.5
.6	7.96	15.93	23.89	31.85	39.81	47.78	55.74	63.70	71.67	.6
.7	8.06	16.11	24.17	32.22	40.28	48.33	56.39	64.44	72.50	.7
.8	8.15	16.30	24.44	32.59	40.74	48.89	57.04	65.19	73.33	.8
.9	8.24	16.48	24.72	32.96	41.20	49.44	57.69	65.93	74.17	.9
9.0	8.33	16.67	25.00	33.33	41.67	50.00	58.33	66.67	75.00	9.0
.1	8.43	16.85	25.28	33.70	42.13	50.56	58.98	67.41	75.83	.1
.2	8.52	17.04	25.56	34.07	42.59	51.11	59.63	68.15	76.67	.2
.3	8.61	17.22	25.83	34.44	43.06	51.67	60.28	68.89	77.50	.3
.4	8.70	17.41	26.11	34.81	43.52	52.22	60.93	69.63	78.33	.4
9.5	8.80	17.59	26.39	35.19	43.98	52.78	61.57	70.37	79.17	9.5
.6	8.89	17.78	26.67	35.56	44.44	53.33	62.22	71.11	80.00	.6
.7	8.98	17.96	26.94	35.93	44.91	53.89	62.87	71.85	80.83	.7
.8	9.07	18.15	27.22	36.30	45.37	54.44	63.52	72.59	81.67	.8
.9	9.17	18.33	27.50	36.67	45.83	55.00	64.17	73.33	82.50	.9
10.0	9.26	18.52	27.78	37.04	46.30	55.56	64.81	74.07	83.33	10.0
.1	9.35	18.70	28.06	37.41	46.76	56.11	65.46	74.81	84.17	.1
.2	9.44	18.89	28.33	37.78	47.22	56.67	66.11	75.56	85.00	.2
.3	9.54	19.07	28.61	38.15	47.69	57.22	66.76	76.30	85.83	.3
.4	9.63	19.26	28.89	38.52	48.15	57.78	67.41	77.04	86.67	.4
10.5	9.72	19.44	29.17	38.89	48.61	58.33	68.06	77.78	87.50	10.5
.6	9.81	19.63	29.44	39.26	49.07	58.89	68.70	78.52	88.33	.6
.7	9.91	19.81	29.72	39.63	49.54	59.44	69.35	79.26	89.17	.7
.8	10.00	20.00	30.00	40.00	50.00	60.00	70.00	80.00	90.00	.8
.9	10.09	20.19	30.28	40.37	50.46	60.56	70.65	80.74	90.83	.9
11.0	10.19	20.37	30.56	40.74	50.93	61.11	71.30	81.48	91.67	11.0
.1	10.28	20.56	30.83	41.11	51.39	61.67	71.94	82.22	92.50	.1
.2	10.37	20.74	31.11	41.48	51.85	62.22	72.59	82.96	93.33	.2
.3	10.46	20.93	31.39	41.85	52.31	62.78	73.24	83.70	94.17	.3
.4	10.56	21.11	31.67	42.22	52.78	63.33	73.89	84.44	95.00	.4
11.5	10.65	21.30	31.94	42.59	53.24	63.89	74.54	85.19	95.83	11.5
.6	10.74	21.48	32.22	42.96	53.70	64.44	75.19	85.93	96.67	.6
.7	10.83	21.67	32.50	43.33	54.17	65.00	75.83	86.67	97.50	.7
.8	10.93	21.85	32.78	43.70	54.63	65.56	76.48	87.41	98.33	.8
.9	11.02	22.04	33.06	44.07	55.09	66.11	77.13	88.15	99.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
12.0	11.11	22.22	33.33	44.44	55.56	66.67	77.78	88.89	100.00	12.0
.1	11.20	22.41	33.61	44.81	56.02	67.22	78.43	89.63	100.83	.1
.2	11.30	22.59	33.89	45.19	56.48	67.78	79.07	90.37	101.67	.2
.3	11.39	22.78	34.17	45.56	56.94	68.33	79.72	91.11	102.50	.3
.4	11.48	22.96	34.44	45.93	57.41	68.89	80.37	91.85	103.33	.4
12.5	11.57	23.15	34.72	46.30	57.87	69.44	81.02	92.59	104.17	12.5
.6	11.67	23.33	35.00	46.67	58.33	70.00	81.67	93.33	105.00	.6
.7	11.76	23.52	35.28	47.04	58.80	70.56	82.31	94.07	105.83	.7
.8	11.85	23.70	35.56	47.41	59.26	71.11	82.96	94.81	106.67	.8
.9	11.94	23.89	35.83	47.78	59.72	71.67	83.61	95.56	107.50	.9
13.0	12.04	24.07	36.11	48.15	60.19	72.22	84.26	96.30	108.33	13.0
.1	12.13	24.26	36.39	48.52	60.65	72.78	84.91	97.04	109.17	.1
.2	12.22	24.44	36.67	48.89	61.11	73.33	85.56	97.78	110.00	.2
.3	12.31	24.63	36.94	49.26	61.57	73.89	86.20	98.52	110.83	.3
.4	12.41	24.81	37.22	49.63	62.04	74.44	86.85	99.26	111.67	.4
13.5	12.50	25.00	37.50	50.00	62.50	75.00	87.50	100.00	112.50	13.5
.6	12.59	25.19	37.78	50.37	62.96	75.56	88.15	100.74	113.33	.6
.7	12.69	25.37	38.06	50.74	63.43	76.11	88.80	101.48	114.17	.7
.8	12.78	25.56	38.33	51.11	63.89	76.67	89.44	102.22	115.00	.8
.9	12.87	25.74	38.61	51.48	64.35	77.22	90.09	102.96	115.83	.9
14.0	12.96	25.93	38.89	51.85	64.81	77.78	90.74	103.70	116.67	14.0
.1	13.06	26.11	39.17	52.22	65.28	78.33	91.39	104.44	117.50	.1
.2	13.15	26.30	39.44	52.59	65.74	78.89	92.04	105.19	118.33	.2
.3	13.24	26.48	39.72	52.96	66.20	79.44	92.69	105.93	119.17	.3
.4	13.33	26.67	40.00	53.33	66.67	80.00	93.33	106.67	120.00	.4
14.5	13.43	26.85	40.28	53.70	67.13	80.56	93.98	107.41	120.83	14.5
.6	13.52	27.04	40.56	54.07	67.59	81.11	94.63	108.15	121.67	.6
.7	13.61	27.22	40.83	54.44	68.06	81.67	95.28	108.89	122.50	.7
.8	13.70	27.41	41.11	54.81	68.52	82.22	95.93	109.63	123.33	.8
.9	13.80	27.59	41.39	55.19	68.98	82.78	96.57	110.37	124.17	.9
15.0	13.89	27.78	41.67	55.56	69.44	83.33	97.22	111.11	125.00	15.0
.1	13.98	27.96	41.94	55.93	69.91	83.89	97.87	111.85	125.83	.1
.2	14.07	28.15	42.22	56.30	70.37	84.44	98.52	112.59	126.67	.2
.3	14.17	28.33	42.50	56.67	70.83	85.00	99.17	113.33	127.50	.3
.4	14.26	28.52	42.78	57.04	71.30	85.56	99.81	114.07	128.33	.4
15.5	14.35	28.70	43.06	57.41	71.76	86.11	100.46	114.81	129.17	15.5
.6	14.44	28.89	43.33	57.78	72.22	86.67	101.11	115.56	130.00	.6
.7	14.54	29.07	43.61	58.15	72.69	87.22	101.76	116.30	130.83	.7
.8	14.63	29.26	43.89	58.52	73.15	87.78	102.41	117.04	131.67	.8
.9	14.72	29.44	44.17	58.89	73.61	88.33	103.06	117.78	132.50	.9
16.0	14.81	29.63	44.44	59.26	74.07	88.89	103.70	118.52	133.33	16.0
.1	14.91	29.81	44.72	59.63	74.54	89.44	104.35	119.26	134.17	.1
.2	15.00	30.00	45.00	60.00	75.00	90.00	105.00	120.00	135.00	.2
.3	15.09	30.19	45.28	60.37	75.46	90.56	105.65	120.74	135.83	.3
.4	15.19	30.37	45.56	60.74	75.93	91.11	106.30	121.48	136.67	.4
16.5	15.28	30.56	45.83	61.11	76.39	91.67	106.94	122.22	137.50	16.5
.6	15.37	30.74	46.11	61.48	76.85	92.22	107.59	122.96	138.33	.6
.7	15.46	30.93	46.39	61.85	77.31	92.78	108.24	123.70	139.17	.7
.8	15.56	31.11	46.67	62.22	77.78	93.33	108.89	124.44	140.00	.8
.9	15.65	31.30	46.94	62.59	78.24	93.89	109.54	125.19	140.83	.9
17.0	15.74	31.48	47.22	62.96	78.70	94.44	110.19	125.93	141.67	17.0
.1	15.83	31.67	47.50	63.33	79.17	95.00	110.83	126.67	142.50	.1
.2	15.93	31.85	47.78	63.70	79.63	95.56	111.48	127.41	143.33	.2
.3	16.02	32.04	48.06	64.07	80.09	96.11	112.13	128.15	144.17	.3
.4	16.11	32.22	48.33	64.44	80.56	96.67	112.78	128.89	145.00	.4
17.5	16.20	32.41	48.61	64.81	81.02	97.22	113.43	129.63	145.83	17.5
.6	16.30	32.59	48.89	65.19	81.48	97.78	114.07	130.37	146.67	.6
.7	16.39	32.78	49.17	65.56	81.94	98.33	114.72	131.11	147.50	.7
.8	16.48	32.96	49.44	65.93	82.41	98.89	115.37	131.85	148.33	.8
.9	16.57	33.15	49.72	66.30	82.87	99.44	116.02	132.59	149.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
18.0	16.67	33.33	50.00	66.67	83.33	100.00	116.67	133.33	150.00	18.0
.1	16.76	33.52	50.28	67.04	83.80	100.56	117.31	134.07	150.83	.1
.2	16.85	33.70	50.56	67.41	84.26	101.11	117.96	134.81	151.67	.2
.3	16.94	33.89	50.83	67.78	84.72	101.67	118.61	135.56	152.50	.3
.4	17.04	34.07	51.11	68.15	85.19	102.22	119.26	136.30	153.33	.4
18.5	17.13	34.26	51.39	68.52	85.65	102.78	119.91	137.04	154.17	18.5
.6	17.22	34.44	51.67	68.89	86.11	103.33	120.56	137.78	155.00	.6
.7	17.31	34.63	51.94	69.26	86.57	103.89	121.20	138.52	155.83	.7
.8	17.41	34.81	52.22	69.63	87.04	104.44	121.85	139.26	156.67	.8
.9	17.50	35.00	52.50	70.00	87.50	105.00	122.50	140.00	157.50	.9
19.0	17.59	35.19	52.78	70.37	87.96	105.56	123.15	140.74	158.33	19.0
.1	17.69	35.37	53.06	70.74	88.43	106.11	123.80	141.48	159.17	.1
.2	17.78	35.56	53.33	71.11	88.89	106.67	124.44	142.22	160.00	.2
.3	17.87	35.74	53.61	71.48	89.35	107.22	125.09	142.96	160.83	.3
.4	17.96	35.93	53.89	71.85	89.81	107.78	125.74	143.70	161.67	.4
19.5	18.06	36.11	54.17	72.22	90.28	108.33	126.39	144.44	162.50	19.5
.6	18.15	36.30	54.44	72.59	90.74	108.89	127.04	145.19	163.33	.6
.7	18.24	36.48	54.72	72.96	91.20	109.44	127.69	145.93	164.17	.7
.8	18.33	36.67	55.00	73.33	91.67	110.00	128.33	146.67	165.00	.8
.9	18.43	36.85	55.28	73.70	92.13	110.56	128.98	147.41	165.83	.9
20.0	18.52	37.04	55.56	74.07	92.59	111.11	129.63	148.15	166.67	20.0
.1	18.61	37.22	55.83	74.44	93.06	111.67	130.28	148.89	167.50	.1
.2	18.70	37.41	56.11	74.81	93.52	112.22	130.93	149.63	168.33	.2
.3	18.80	37.59	56.39	75.19	93.98	112.78	131.57	150.37	169.17	.3
.4	18.89	37.78	56.67	75.56	94.44	113.33	132.22	151.11	170.00	.4
20.5	18.98	37.96	56.94	75.93	94.91	113.89	132.87	151.85	170.83	20.5
.6	19.07	38.15	57.22	76.30	95.37	114.44	133.52	152.59	171.67	.6
.7	19.17	38.33	57.50	76.67	95.83	115.00	134.17	153.33	172.50	.7
.8	19.26	38.52	57.78	77.04	96.30	115.56	134.81	154.07	173.33	.8
.9	19.35	38.70	58.06	77.41	96.76	116.11	135.46	154.81	174.17	.9
21.0	19.44	38.89	58.33	77.78	97.22	116.67	136.11	155.56	175.00	21.0
.1	19.54	39.07	58.61	78.15	97.69	117.22	136.76	156.30	175.83	.1
.2	19.63	39.26	58.89	78.52	98.15	117.78	137.41	157.04	176.67	.2
.3	19.72	39.44	59.17	78.89	98.61	118.33	138.06	157.78	177.50	.3
.4	19.81	39.63	59.44	79.26	99.07	118.89	138.70	158.52	178.33	.4
21.5	19.91	39.81	59.72	79.63	99.54	119.44	139.35	159.26	179.17	21.5
.6	20.00	40.00	60.00	80.00	100.00	120.00	140.00	160.00	180.00	.6
.7	20.09	40.19	60.28	80.37	100.46	120.56	140.65	160.74	180.83	.7
.8	20.19	40.37	60.56	80.74	100.93	121.11	141.30	161.48	181.67	.8
.9	20.28	40.56	60.83	81.11	101.39	121.67	141.94	162.22	182.50	.9
22.0	20.37	40.74	61.11	81.48	101.85	122.22	142.59	162.96	183.33	22.0
.1	20.46	40.93	61.39	81.85	102.31	122.78	143.24	163.70	184.17	.1
.2	20.56	41.11	61.67	82.22	102.78	123.33	143.89	164.44	185.00	.2
.3	20.65	41.30	61.94	82.59	103.24	123.89	144.54	165.19	185.83	.3
.4	20.74	41.48	62.22	82.96	103.70	124.44	145.19	165.93	186.67	.4
22.5	20.83	41.67	62.50	83.33	104.17	125.00	145.83	166.67	187.50	22.5
.6	20.93	41.85	62.78	83.70	104.63	125.56	146.48	167.41	188.33	.6
.7	21.02	42.04	63.06	84.07	105.09	126.11	147.13	168.15	189.17	.7
.8	21.11	42.22	63.33	84.44	105.56	126.67	147.78	168.89	190.00	.8
.9	21.20	42.41	63.61	84.81	106.02	127.22	148.43	169.63	190.83	.9
23.0	21.30	42.59	63.89	85.19	106.48	127.78	149.07	170.37	191.67	23.0
.1	21.39	42.78	64.17	85.56	106.94	128.33	149.72	171.11	192.50	.1
.2	21.48	42.96	64.44	85.93	107.41	128.89	150.37	171.85	193.33	.2
.3	21.57	43.15	64.72	86.30	107.87	129.44	151.02	172.59	194.17	.3
.4	21.67	43.33	65.00	86.67	108.33	130.00	151.67	173.33	195.00	.4
23.5	21.76	43.52	65.28	87.04	108.80	130.56	152.31	174.07	195.83	23.5
.6	21.85	43.70	65.56	87.41	109.26	131.11	152.96	174.81	196.67	.6
.7	21.94	43.89	65.83	87.78	109.72	131.67	153.61	175.56	197.50	.7
.8	22.04	44.07	66.11	88.15	110.19	132.22	154.26	176.30	198.33	.8
.9	22.13	44.26	66.39	88.52	110.65	132.78	154.91	177.04	199.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
24.0	22.22	44.44	66.67	88.89	111.11	133.33	155.56	177.78	200.00	24.0
.1	22.31	44.63	66.94	89.26	111.57	133.89	156.20	178.52	200.83	.1
.2	22.41	44.81	67.22	89.63	112.04	134.44	156.85	179.26	201.67	.2
.3	22.50	45.00	67.50	90.00	112.50	135.00	157.50	180.00	202.50	.3
.4	22.59	45.19	67.78	90.37	112.96	135.56	158.15	180.74	203.33	.4
24.5	22.69	45.37	68.06	90.74	113.43	136.11	158.80	181.48	204.17	24.5
.6	22.78	45.56	68.33	91.11	113.89	136.67	159.44	182.22	205.00	.6
.7	22.87	45.74	68.61	91.48	114.35	137.22	160.09	182.96	205.83	.7
.8	22.96	45.93	68.89	91.85	114.81	137.78	160.74	183.70	206.67	.8
.9	23.06	46.11	69.17	92.22	115.28	138.33	161.39	184.44	207.50	.9
25.0	23.15	46.30	69.44	92.59	115.74	138.89	162.04	185.19	208.33	25.0
.1	23.24	46.48	69.72	92.96	116.20	139.44	162.69	185.93	209.17	.1
.2	23.33	46.67	70.00	93.33	116.67	140.00	163.33	186.67	210.00	.2
.3	23.43	46.85	70.28	93.70	117.13	140.56	163.98	187.41	210.83	.3
.4	23.52	47.04	70.56	94.07	117.59	141.11	164.63	188.15	211.67	.4
25.5	23.61	47.22	70.83	94.44	118.06	141.67	165.28	188.89	212.50	25.5
.6	23.70	47.41	71.11	94.81	118.52	142.22	165.93	189.63	213.33	.6
.7	23.80	47.59	71.39	95.19	118.98	142.78	166.57	190.37	214.17	.7
.8	23.89	47.78	71.67	95.56	119.44	143.33	167.22	191.11	215.00	.8
.9	23.98	47.96	71.94	95.93	119.91	143.89	167.87	191.85	215.83	.9
26.0	24.07	48.15	72.22	96.30	120.37	144.44	168.52	192.59	216.67	26.0
.1	24.17	48.33	72.50	96.67	120.83	145.00	169.17	193.33	217.50	.1
.2	24.26	48.52	72.78	97.04	121.30	145.56	169.81	194.07	218.33	.2
.3	24.35	48.70	73.06	97.41	121.76	146.11	170.46	194.81	219.17	.3
.4	24.44	48.89	73.33	97.78	122.22	146.67	171.11	195.56	220.00	.4
26.5	24.54	49.07	73.61	98.15	122.69	147.22	171.76	196.30	220.83	26.5
.6	24.63	49.26	73.89	98.52	123.15	147.78	172.41	197.04	221.67	.6
.7	24.72	49.44	74.17	98.89	123.61	148.33	173.06	197.78	222.50	.7
.8	24.81	49.63	74.44	99.26	124.07	148.89	173.70	198.52	223.33	.8
.9	24.91	49.81	74.72	99.63	124.54	149.44	174.35	199.26	224.17	.9
27.0	25.00	50.00	75.00	100.00	125.00	150.00	175.00	200.00	225.00	27.0
.1	25.09	50.19	75.28	100.37	125.46	150.56	175.65	200.74	225.83	.1
.2	25.19	50.37	75.56	100.74	125.93	151.11	176.30	201.48	226.67	.2
.3	25.28	50.56	75.83	101.11	126.39	151.67	176.94	202.22	227.50	.3
.4	25.37	50.74	76.11	101.48	126.85	152.22	177.59	202.96	228.33	.4
27.5	25.46	50.93	76.39	101.85	127.31	152.78	178.24	203.70	229.17	27.5
.6	25.56	51.11	76.67	102.22	127.78	153.33	178.89	204.44	230.00	.6
.7	25.65	51.30	76.94	102.59	128.24	153.89	179.54	205.19	230.83	.7
.8	25.74	51.48	77.22	102.96	128.70	154.44	180.19	205.93	231.67	.8
.9	25.83	51.67	77.50	103.33	129.17	155.00	180.83	206.67	232.50	.9
28.0	25.93	51.85	77.78	103.70	129.63	155.56	181.48	207.41	233.33	28.0
.1	26.02	52.04	78.06	104.07	130.09	156.11	182.13	208.15	234.17	.1
.2	26.11	52.22	78.33	104.44	130.56	156.67	182.78	208.89	235.00	.2
.3	26.20	52.41	78.61	104.81	131.02	157.22	183.43	209.63	235.83	.3
.4	26.30	52.59	78.89	105.19	131.48	157.78	184.07	210.37	236.67	.4
28.5	26.39	52.78	79.17	105.56	131.94	158.33	184.72	211.11	237.50	28.5
.6	26.48	52.96	79.44	105.93	132.41	158.89	185.37	211.85	238.33	.6
.7	26.57	53.15	79.72	106.30	132.87	159.44	186.02	212.59	239.17	.7
.8	26.67	53.33	80.00	106.67	133.33	160.00	186.67	213.33	240.00	.8
.9	26.76	53.52	80.28	107.04	133.80	160.56	187.31	214.07	240.83	.9
29.0	26.85	53.70	80.56	107.41	134.26	161.11	187.96	214.81	241.67	29.0
.1	26.94	53.89	80.83	107.78	134.72	161.67	188.61	215.56	242.50	.1
.2	27.04	54.07	81.11	108.15	135.19	162.22	189.26	216.30	243.33	.2
.3	27.13	54.26	81.39	108.52	135.65	162.78	189.91	217.04	244.17	.3
.4	27.22	54.44	81.67	108.89	136.11	163.33	190.56	217.78	245.00	.4
29.5	27.31	54.63	81.94	109.26	136.57	163.89	191.20	218.52	245.83	29.5
.6	27.41	54.81	82.22	109.63	137.04	164.44	191.85	219.26	246.67	.6
.7	27.50	55.00	82.50	110.00	137.50	165.00	192.50	220.00	247.50	.7
.8	27.59	55.19	82.78	110.37	137.96	165.56	193.15	220.74	248.33	.8
.9	27.69	55.37	83.06	110.74	138.43	166.11	193.80	221.48	249.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
30.0	27.78	55.56	83.33	111.11	138.89	166.67	194.44	222.22	250.00	30.0
.1	27.87	55.74	83.61	111.48	139.35	167.22	195.09	222.96	250.83	.1
.2	27.96	55.93	83.89	111.85	139.81	167.78	195.74	223.70	251.67	.2
.3	28.06	56.11	84.17	112.22	140.28	168.33	196.39	224.44	252.50	.3
.4	28.15	56.30	84.44	112.59	140.74	168.89	197.04	225.19	253.33	.4
30.5	28.24	56.48	84.72	112.96	141.20	169.44	197.69	225.93	254.17	30.5
.6	28.33	56.67	85.00	113.33	141.67	170.00	198.33	226.67	255.00	.6
.7	28.43	56.85	85.28	113.70	142.13	170.56	198.98	227.41	255.83	.7
.8	28.52	57.04	85.56	114.07	142.59	171.11	199.63	228.15	256.67	.8
.9	28.61	57.22	85.83	114.44	143.06	171.67	200.28	228.89	257.50	.9
31.0	28.70	57.41	86.11	114.81	143.52	172.22	200.93	229.63	258.33	31.0
.1	28.80	57.59	86.39	115.19	143.98	172.78	201.57	230.37	259.17	.1
.2	28.89	57.78	86.67	115.56	144.44	173.33	202.22	231.11	260.00	.2
.3	28.98	57.96	86.94	115.93	144.91	173.89	202.87	231.85	260.83	.3
.4	29.07	58.15	87.22	116.30	145.37	174.44	203.52	232.59	261.67	.4
31.5	29.17	58.33	87.50	116.67	145.83	175.00	204.17	233.33	262.50	31.5
.6	29.26	58.52	87.78	117.04	146.30	175.56	204.81	234.07	263.33	.6
.7	29.35	58.70	88.06	117.41	146.76	176.11	205.46	234.81	264.17	.7
.8	29.44	58.89	88.33	117.78	147.22	176.67	206.11	235.56	265.00	.8
.9	29.54	59.07	88.61	118.15	147.69	177.22	206.76	236.30	265.83	.9
32.0	29.63	59.26	88.89	118.52	148.15	177.78	207.41	237.04	266.67	32.0
.1	29.72	59.44	89.17	118.89	148.61	178.33	208.06	237.78	267.50	.1
.2	29.81	59.63	89.44	119.26	149.07	178.89	208.70	238.52	268.33	.2
.3	29.91	59.81	89.72	119.63	149.54	179.44	209.35	239.26	269.17	.3
.4	30.00	60.00	90.00	120.00	150.00	180.00	210.00	240.00	270.00	.4
32.5	30.09	60.19	90.28	120.37	150.46	180.56	210.65	240.74	270.83	32.5
.6	30.19	60.37	90.56	120.74	150.93	181.11	211.30	241.48	271.67	.6
.7	30.28	60.56	90.83	121.11	151.39	181.67	211.94	242.22	272.50	.7
.8	30.37	60.74	91.11	121.48	151.85	182.22	212.59	242.96	273.33	.8
.9	30.46	60.93	91.39	121.85	152.31	182.78	213.24	243.70	274.17	.9
33.0	30.56	61.11	91.67	122.22	152.78	183.33	213.89	244.44	275.00	33.0
.1	30.65	61.30	91.94	122.59	153.24	183.89	214.54	245.19	275.83	.1
.2	30.74	61.48	92.22	122.96	153.70	184.44	215.19	245.93	276.67	.2
.3	30.83	61.67	92.50	123.33	154.17	185.00	215.83	246.67	277.50	.3
.4	30.93	61.85	92.78	123.70	154.63	185.56	216.48	247.41	278.33	.4
33.5	31.02	62.04	93.06	124.07	155.09	186.11	217.13	248.15	279.17	33.5
.6	31.11	62.22	93.33	124.44	155.56	186.67	217.78	248.89	280.00	.6
.7	31.20	62.41	93.61	124.81	156.02	187.22	218.43	249.63	280.83	.7
.8	31.30	62.59	93.89	125.19	156.48	187.78	219.07	250.37	281.67	.8
.9	31.39	62.78	94.17	125.56	156.94	188.33	219.72	251.11	282.50	.9
34.0	31.48	62.96	94.44	125.93	157.41	188.89	220.37	251.85	283.33	34.0
.1	31.57	63.15	94.72	126.30	157.87	189.44	221.02	252.59	284.17	.1
.2	31.67	63.33	95.00	126.67	158.33	190.00	221.67	253.33	285.00	.2
.3	31.76	63.52	95.28	127.04	158.80	190.56	222.31	254.07	285.83	.3
.4	31.85	63.70	95.56	127.41	159.26	191.11	222.96	254.81	286.67	.4
34.5	31.94	63.89	95.83	127.78	159.72	191.67	223.61	255.56	287.50	34.5
.6	32.04	64.07	96.11	128.15	160.19	192.22	224.26	256.30	288.33	.6
.7	32.13	64.26	96.39	128.52	160.65	192.78	224.91	257.04	289.17	.7
.8	32.22	64.44	96.67	128.89	161.11	193.33	225.56	257.78	290.00	.8
.9	32.31	64.63	96.94	129.26	161.57	193.89	226.20	258.52	290.83	.9
35.0	32.41	64.81	97.22	129.63	162.04	194.44	226.85	259.26	291.67	35.0
.1	32.50	65.00	97.50	130.00	162.50	195.00	227.50	260.00	292.50	.1
.2	32.59	65.19	97.78	130.37	162.96	195.56	228.15	260.74	293.33	.2
.3	32.69	65.37	98.06	130.74	163.43	196.11	228.80	261.48	294.17	.3
.4	32.78	65.56	98.33	131.11	163.89	196.67	229.44	262.22	295.00	.4
35.5	32.87	65.74	98.61	131.48	164.35	197.22	230.09	262.96	295.83	35.5
.6	32.96	65.93	98.89	131.85	164.81	197.78	230.74	263.70	296.67	.6
.7	33.06	66.11	99.17	132.22	165.28	198.33	231.39	264.44	297.50	.7
.8	33.15	66.30	99.44	132.59	165.74	198.89	232.04	265.19	298.33	.8
.9	33.24	66.48	99.72	132.96	166.20	199.44	232.69	265.93	299.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
36.0	33.33	66.67	100.00	133.33	166.67	200.00	233.33	266.67	300.00	36.0
.1	33.43	66.85	100.28	133.70	167.13	200.56	233.98	267.41	300.83	.1
.2	33.52	67.04	100.56	134.07	167.59	201.11	234.63	268.15	301.67	.2
.3	33.61	67.22	100.83	134.44	168.06	201.67	235.28	268.89	302.50	.3
.4	33.70	67.41	101.11	134.81	168.52	202.22	235.93	269.63	303.33	.4
36.5	33.80	67.59	101.39	135.19	168.98	202.78	236.57	270.37	304.17	36.5
.6	33.89	67.78	101.67	135.56	169.44	203.33	237.22	271.11	305.00	.6
.7	33.98	67.96	101.94	135.93	169.91	203.89	237.87	271.85	305.83	.7
.8	34.07	68.15	102.22	136.30	170.37	204.44	238.52	272.59	306.67	.8
.9	34.17	68.33	102.50	136.67	170.83	205.00	239.17	273.33	307.50	.9
37.0	34.26	68.52	102.78	137.04	171.30	205.56	239.81	274.07	308.33	37.0
.1	34.35	68.70	103.06	137.41	171.76	206.11	240.46	274.81	309.17	.1
.2	34.44	68.89	103.33	137.78	172.22	206.67	241.11	275.56	310.00	.2
.3	34.54	69.07	103.61	138.15	172.69	207.22	241.76	276.30	310.83	.3
.4	34.63	69.26	103.89	138.52	173.15	207.78	242.41	277.04	311.67	.4
37.5	34.72	69.44	104.17	138.89	173.61	208.33	243.06	277.78	312.50	37.5
.6	34.81	69.63	104.44	139.26	174.07	208.89	243.70	278.52	313.33	.6
.7	34.91	69.81	104.72	139.63	174.54	209.44	244.35	279.26	314.17	.7
.8	35.00	70.00	105.00	140.00	175.00	210.00	245.00	280.00	315.00	.8
.9	35.09	70.19	105.28	140.37	175.46	210.56	245.65	280.74	315.83	.9
38.0	35.19	70.37	105.56	140.74	175.93	211.11	246.30	281.48	316.67	38.0
.1	35.28	70.56	105.83	141.11	176.39	211.67	246.94	282.22	317.50	.1
.2	35.37	70.74	106.11	141.48	176.85	212.22	247.59	282.96	318.33	.2
.3	35.46	70.93	106.39	141.85	177.31	212.78	248.24	283.70	319.17	.3
.4	35.56	71.11	106.67	142.22	177.78	213.33	248.89	284.44	320.00	.4
38.5	35.65	71.30	106.94	142.59	178.24	213.89	249.54	285.19	320.83	38.5
.6	35.74	71.48	107.22	142.96	178.70	214.44	250.19	285.93	321.67	.6
.7	35.83	71.67	107.50	143.33	179.17	215.00	250.83	286.67	322.50	.7
.8	35.93	71.85	107.78	143.70	179.63	215.56	251.48	287.41	323.33	.8
.9	36.02	72.04	108.06	144.07	180.09	216.11	252.13	288.15	324.17	.9
39.0	36.11	72.22	108.33	144.44	180.56	216.67	252.78	288.89	325.00	39.0
.1	36.20	72.41	108.61	144.81	181.02	217.22	253.43	289.63	325.83	.1
.2	36.30	72.59	108.89	145.19	181.48	217.78	254.07	290.37	326.67	.2
.3	36.39	72.78	109.17	145.56	181.94	218.33	254.72	291.11	327.50	.3
.4	36.48	72.96	109.44	145.93	182.41	218.89	255.37	291.85	328.33	.4
39.5	36.57	73.15	109.72	146.30	182.87	219.44	256.02	292.59	329.17	39.5
.6	36.67	73.33	110.00	146.67	183.33	220.00	256.67	293.33	330.00	.6
.7	36.76	73.52	110.28	147.04	183.80	220.56	257.31	294.07	330.83	.7
.8	36.85	73.70	110.56	147.41	184.26	221.11	257.96	294.81	331.67	.8
.9	36.94	73.89	110.83	147.78	184.72	221.67	258.61	295.56	332.50	.9
40.0	37.04	74.07	111.11	148.15	185.19	222.22	259.26	296.30	333.33	40.0
.1	37.13	74.26	111.39	148.52	185.65	222.78	259.91	297.04	334.17	.1
.2	37.22	74.44	111.67	148.89	186.11	223.33	260.56	297.78	335.00	.2
.3	37.31	74.63	111.94	149.26	186.57	223.89	261.20	298.52	335.83	.3
.4	37.41	74.81	112.22	149.63	187.04	224.44	261.85	299.26	336.67	.4
40.5	37.50	75.00	112.50	150.00	187.50	225.00	262.50	300.00	337.50	40.5
.6	37.59	75.19	112.78	150.37	187.96	225.56	263.15	300.74	338.33	.6
.7	37.69	75.37	113.06	150.74	188.43	226.11	263.80	301.48	339.17	.7
.8	37.78	75.56	113.33	151.11	188.89	226.67	264.44	302.22	340.00	.8
.9	37.87	75.74	113.61	151.48	189.35	227.22	265.09	302.96	340.83	.9
41.0	37.96	75.93	113.89	151.85	189.81	227.78	265.74	303.70	341.67	41.0
.1	38.06	76.11	114.17	152.22	190.28	228.33	266.39	304.44	342.50	.1
.2	38.15	76.30	114.44	152.59	190.74	228.89	267.04	305.19	343.33	.2
.3	38.24	76.48	114.72	152.96	191.20	229.44	267.69	305.93	344.17	.3
.4	38.33	76.67	115.00	153.33	191.67	230.00	268.33	306.67	345.00	.4
41.5	38.43	76.85	115.28	153.70	192.13	230.56	268.98	307.41	345.83	41.5
.6	38.52	77.04	115.56	154.07	192.59	231.11	269.63	308.15	346.67	.6
.7	38.61	77.22	115.83	154.44	193.06	231.67	270.28	308.89	347.50	.7
.8	38.70	77.41	116.11	154.81	193.52	232.22	270.93	309.63	348.33	.8
.9	38.80	77.59	116.39	155.19	193.98	232.78	271.57	310.37	349.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXX.—TRIANGULAR PRISMS. CU. YDS. PER 50 FEET.

	WIDTH									
Hght	1	2	3	4	5	6	7	8	9	Hght
42.0	38.89	77.78	116.67	155.56	194.44	233.33	272.22	311.11	350.00	42.0
.1	38.98	77.96	116.94	155.93	194.91	233.89	272.87	311.85	350.83	.1
.2	39.07	78.15	117.22	156.30	195.37	234.44	273.52	312.59	351.67	.2
.3	39.17	78.33	117.50	156.67	195.83	235.00	274.17	313.33	352.50	.3
.4	39.26	78.52	117.78	157.04	196.30	235.56	274.81	314.07	353.33	.4
42.5	39.35	78.70	118.06	157.41	196.76	236.11	275.46	314.81	354.17	42.5
.6	39.44	78.89	118.33	157.78	197.22	236.67	276.11	315.56	355.00	.6
.7	39.54	79.07	118.61	158.15	197.69	237.22	276.76	316.30	355.83	.7
.8	39.63	79.26	118.89	158.52	198.15	237.78	277.41	317.04	356.67	.8
.9	39.72	79.44	119.17	158.89	198.61	238.33	278.06	317.78	357.50	.9
43.0	39.81	79.63	119.44	159.26	199.07	238.89	278.70	318.52	358.33	43.0
.1	39.91	79.81	119.72	159.63	199.54	239.44	279.35	319.26	359.17	.1
.2	40.00	80.00	120.00	160.00	200.00	240.00	280.00	320.00	360.00	.2
.3	40.09	80.19	120.28	160.37	200.46	240.56	280.65	320.74	360.83	.3
.4	40.19	80.37	120.56	160.74	200.93	241.11	281.30	321.48	361.67	.4
43.5	40.28	80.56	120.83	161.11	201.39	241.67	281.94	322.22	362.50	43.5
.6	40.37	80.74	121.11	161.48	201.85	242.22	282.59	322.96	363.33	.6
.7	40.46	80.93	121.39	161.85	202.31	242.78	283.24	323.70	364.17	.7
.8	40.56	81.11	121.67	162.22	202.78	243.33	283.89	324.44	365.00	.8
.9	40.65	81.30	121.94	162.59	203.24	243.89	284.54	325.19	365.83	.9
44.0	40.74	81.48	122.22	162.96	203.70	244.44	285.19	325.93	366.67	44.0
.1	40.83	81.67	122.50	163.33	204.17	245.00	285.83	326.67	367.50	.1
.2	40.93	81.85	122.78	163.70	204.63	245.56	286.48	327.41	368.33	.2
.3	41.02	82.04	123.06	164.07	205.09	246.11	287.13	328.15	369.17	.3
.4	41.11	82.22	123.33	164.44	205.56	246.67	287.78	328.89	370.00	.4
44.5	41.20	82.41	123.61	164.81	206.02	247.22	288.43	329.63	370.83	44.5
.6	41.30	82.59	123.89	165.19	206.48	247.78	289.07	330.37	371.67	.6
.7	41.39	82.78	124.17	165.56	206.94	248.33	289.72	331.11	372.50	.7
.8	41.48	82.96	124.44	165.93	207.41	248.89	290.37	331.85	373.33	.8
.9	41.57	83.15	124.72	166.30	207.87	249.44	291.02	332.59	374.17	.9
45.0	41.67	83.33	125.00	166.67	208.33	250.00	291.67	333.33	375.00	45.0
.1	41.76	83.52	125.28	167.04	208.80	250.56	292.31	334.07	375.83	.1
.2	41.85	83.70	125.56	167.41	209.26	251.11	292.96	334.81	376.67	.2
.3	41.94	83.89	125.83	167.78	209.72	251.67	293.61	335.56	377.50	.3
.4	42.04	84.07	126.11	168.15	210.19	252.22	294.26	336.30	378.33	.4
45.5	42.13	84.26	126.39	168.52	210.65	252.78	294.91	337.04	379.17	45.5
.6	42.22	84.44	126.67	168.89	211.11	253.33	295.56	337.78	380.00	.6
.7	42.31	84.63	126.94	169.26	211.57	253.89	296.20	338.52	380.83	.7
.8	42.41	84.81	127.22	169.63	212.04	254.44	296.85	339.26	381.67	.8
.9	42.50	85.00	127.50	170.00	212.50	255.00	297.50	340.00	382.50	.9
46.0	42.59	85.19	127.78	170.37	212.96	255.56	298.15	340.74	383.33	46.0
.1	42.69	85.37	128.06	170.74	213.43	256.11	298.80	341.48	384.17	.1
.2	42.78	85.56	128.33	171.11	213.89	256.67	299.44	342.22	385.00	.2
.3	42.87	85.74	128.61	171.48	214.35	257.22	300.09	342.96	385.83	.3
.4	42.96	85.93	128.89	171.85	214.81	257.78	300.74	343.70	386.67	.4
46.5	43.06	86.11	129.17	172.22	215.28	258.33	301.39	344.44	387.50	46.5
.6	43.15	86.30	129.44	172.59	215.74	258.89	302.04	345.19	388.33	.6
.7	43.24	86.48	129.72	172.96	216.20	259.44	302.69	345.93	389.17	.7
.8	43.33	86.67	130.00	173.33	216.67	260.00	303.33	346.67	390.00	.8
.9	43.43	86.85	130.28	173.70	217.13	260.56	303.98	347.41	390.83	.9
47.0	43.52	87.04	130.56	174.07	217.59	261.11	304.63	348.15	391.67	47.0
.1	43.61	87.22	130.83	174.44	218.06	261.67	305.28	348.89	392.50	.1
.2	43.70	87.41	131.11	174.81	218.52	262.22	305.93	349.63	393.33	.2
.3	43.80	87.59	131.39	175.19	218.98	262.78	306.57	350.37	394.17	.3
.4	43.89	87.78	131.67	175.56	219.44	263.33	307.22	351.11	395.00	.4
47.5	43.98	87.96	131.94	175.93	219.91	263.89	307.87	351.85	395.83	47.5
.6	44.07	88.15	132.22	176.30	220.37	264.44	308.52	352.59	396.67	.6
.7	44.17	88.33	132.50	176.67	220.83	265.00	309.17	353.33	397.50	.7
.8	44.26	88.52	132.78	177.04	221.30	265.56	309.81	354.07	398.33	.8
.9	44.35	88.70	133.06	177.41	221.76	266.11	310.46	354.81	399.17	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXXI.—PRISMOIDAL CORRECTION. CU. YDS. PER 100 FT

c_0-c_1	1	2	3	4	5	6	7	8	9	c_0-c_1
D_0-D_1										D_0-D_1
0.1	.03	.06	.09	.12	.15	.19	.22	.25	.28	0.1
.2	.06	.12	.19	.25	.31	.37	.43	.49	.56	.2
.3	.09	.19	.28	.37	.46	.56	.65	.74	.83	.3
.4	.12	.25	.37	.49	.62	.74	.86	.99	1.11	.4
0.5	.15	.31	.46	.62	.77	.93	1.08	1.23	1.39	0.5
.6	.19	.37	.56	.74	.93	1.11	1.30	1.48	1.67	.6
.7	.22	.43	.65	.86	1.08	1.30	1.51	1.73	1.94	.7
.8	.25	.49	.74	.99	1.23	1.48	1.73	1.98	2.22	.8
.9	.28	.56	.83	1.11	1.39	1.67	1.94	2.22	2.50	.9
1.0	.31	.62	.93	1.23	1.54	1.85	2.16	2.47	2.78	1.0
.1	.34	.68	1.02	1.36	1.70	2.04	2.38	2.72	3.06	.1
.2	.37	.74	1.11	1.48	1.85	2.22	2.59	2.96	3.33	.2
.3	.40	.80	1.20	1.60	2.01	2.41	2.81	3.21	3.61	.3
.4	.43	.86	1.30	1.73	2.16	2.59	3.02	3.46	3.89	.4
1.5	.46	.93	1.39	1.85	2.31	2.78	3.24	3.70	4.17	1.5
.6	.49	.99	1.48	1.98	2.47	2.96	3.46	3.95	4.44	.6
.7	.52	1.05	1.57	2.10	2.62	3.15	3.67	4.20	4.72	.7
.8	.56	1.11	1.67	2.22	2.78	3.33	3.89	4.44	5.00	.8
.9	.59	1.17	1.76	2.35	2.93	3.52	4.10	4.69	5.28	.9
2.0	.62	1.23	1.85	2.47	3.09	3.70	4.32	4.94	5.56	2.0
.1	.65	1.30	1.94	2.59	3.24	3.89	4.54	5.19	5.83	.1
.2	.68	1.36	2.04	2.72	3.40	4.07	4.75	5.43	6.11	.2
.3	.71	1.42	2.13	2.84	3.55	4.26	4.97	5.68	6.39	.3
.4	.74	1.48	2.22	2.96	3.70	4.44	5.19	5.93	6.67	.4
2.5	.77	1.54	2.31	3.09	3.86	4.63	5.40	6.17	6.94	2.5
.6	.80	1.60	2.41	3.21	4.01	4.81	5.62	6.42	7.22	.6
.7	.83	1.67	2.50	3.33	4.17	5.00	5.83	6.67	7.50	.7
.8	.86	1.73	2.59	3.46	4.32	5.19	6.05	6.91	7.78	.8
.9	.90	1.79	2.69	3.58	4.48	5.37	6.27	7.16	8.06	.9
3.0	.93	1.85	2.78	3.70	4.63	5.56	6.48	7.41	8.33	3.0
.1	.96	1.91	2.87	3.83	4.78	5.74	6.70	7.65	8.61	.1
.2	.99	1.98	2.96	3.95	4.94	5.93	6.91	7.90	8.89	.2
.3	1.02	2.04	3.06	4.07	5.09	6.11	7.13	8.15	9.17	.3
.4	1.05	2.10	3.15	4.20	5.25	6.30	7.35	8.40	9.44	.4
3.5	1.08	2.16	3.24	4.32	5.40	6.48	7.56	8.64	9.72	3.5
.6	1.11	2.22	3.33	4.44	5.56	6.67	7.78	8.89	10.00	.6
.7	1.14	2.28	3.43	4.57	5.71	6.85	7.99	9.14	10.28	.7
.8	1.17	2.35	3.52	4.69	5.86	7.04	8.21	9.38	10.56	.8
.9	1.20	2.41	3.61	4.81	6.02	7.22	8.43	9.63	10.83	.9
4.0	1.23	2.47	3.70	4.94	6.17	7.41	8.64	9.88	11.11	4.0
.1	1.27	2.53	3.80	5.06	6.33	7.59	8.86	10.12	11.39	.1
.2	1.30	2.59	3.89	5.19	6.48	7.78	9.07	10.37	11.67	.2
.3	1.33	2.65	3.98	5.31	6.64	7.96	9.29	10.62	11.94	.3
.4	1.36	2.72	4.07	5.43	6.79	8.15	9.51	10.86	12.22	.4
4.5	1.39	2.78	4.17	5.56	6.94	8.33	9.72	11.11	12.50	4.5
.6	1.42	2.84	4.26	5.68	7.10	8.52	9.94	11.36	12.78	.6
.7	1.45	2.90	4.35	5.80	7.25	8.70	10.15	11.60	13.06	.7
.8	1.48	2.96	4.44	5.93	7.41	8.89	10.37	11.85	13.33	.8
.9	1.51	3.02	4.54	6.05	7.56	9.07	10.59	12.10	13.61	.9
5.0	1.54	3.09	4.63	6.17	7.72	9.26	10.80	12.35	13.89	5.0
.1	1.57	3.15	4.72	6.30	7.87	9.44	11.02	12.59	14.17	.1
.2	1.60	3.21	4.81	6.42	8.02	9.63	11.23	12.84	14.44	.2
.3	1.64	3.27	4.91	6.54	8.18	9.81	11.45	13.09	14.72	.3
.4	1.67	3.33	5.00	6.67	8.33	10.00	11.67	13.33	15.00	.4
5.5	1.70	3.40	5.09	6.79	8.49	10.19	11.88	13.58	15.28	5.5
.6	1.73	3.46	5.19	6.91	8.64	10.37	12.10	13.83	15.56	.6
.7	1.76	3.52	5.28	7.04	8.80	10.56	12.31	14.07	15.83	.7
.8	1.79	3.58	5.37	7.16	8.95	10.74	12.53	14.32	16.11	.8
.9	1.82	3.64	5.46	7.28	9.10	10.93	12.75	14.57	16.39	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXXI.—PRISMOIDAL CORRECTION. CU. YDS. PER 100 FT.

c_0-c_1	1	2	.3	4	5	6	7	8	9	c_0-c_1
D_0-D_1										D_0-D_1
6.0	1.85	3.70	5.56	7.41	9.26	11.11	12.96	14.81	16.67	6.0
.1	1.88	3.77	5.65	7.53	9.41	11.30	13.18	15.06	16.94	.1
.2	1.91	3.83	5.74	7.65	9.57	11.48	13.40	15.31	17.22	.2
.3	1.94	3.89	5.83	7.78	9.72	11.67	13.61	15.56	17.50	.3
.4	1.98	3.95	5.93	7.90	9.88	11.85	13.83	15.80	17.78	.4
6.5	2.01	4.01	6.02	8.02	10.03	12.04	14.04	16.05	18.06	6.5
.6	2.04	4.07	6.11	8.15	10.19	12.22	14.26	16.30	18.33	.6
.7	2.07	4.14	6.20	8.27	10.34	12.41	14.48	16.54	18.61	.7
.8	2.10	4.20	6.30	8.40	10.49	12.59	14.69	16.79	18.89	.8
.9	2.13	4.26	6.39	8.52	10.65	12.78	14.91	17.04	19.17	.9
7.0	2.16	4.32	6.48	8.64	10.80	12.96	15.12	17.28	19.44	7.0
.1	2.19	4.38	6.57	8.77	10.96	13.15	15.34	17.53	19.72	.1
.2	2.22	4.44	6.67	8.89	11.11	13.33	15.56	17.78	20.00	.2
.3	2.25	4.51	6.76	9.01	11.27	13.52	15.77	18.02	20.28	.3
.4	2.28	4.57	6.85	9.14	11.42	13.70	15.99	18.27	20.56	.4
7.5	2.31	4.63	6.94	9.26	11.57	13.89	16.20	18.52	20.83	7.5
.6	2.35	4.69	7.04	9.38	11.73	14.07	16.42	18.77	21.11	.6
.7	2.38	4.75	7.13	9.51	11.88	14.26	16.64	19.01	21.39	.7
.8	2.41	4.81	7.22	9.63	12.04	14.44	16.85	19.26	21.67	.8
.9	2.44	4.88	7.31	9.75	12.19	14.63	17.07	19.51	21.94	.9
8.0	2.47	4.94	7.41	9.88	12.35	14.81	17.28	19.75	22.22	8.0
.1	2.50	5.00	7.50	10.00	12.50	15.00	17.50	20.00	22.50	.1
.2	2.53	5.06	7.59	10.12	12.65	15.19	17.72	20.25	22.78	.2
.3	2.56	5.12	7.69	10.25	12.81	15.37	17.93	20.49	23.06	.3
.4	2.59	5.19	7.78	10.37	12.96	15.56	18.15	20.74	23.33	.4
8.5	2.62	5.25	7.87	10.49	13.12	15.74	18.36	20.99	23.61	8.5
.6	2.65	5.31	7.96	10.62	13.27	15.93	18.58	21.23	23.89	.6
.7	2.69	5.37	8.06	10.74	13.43	16.11	18.80	21.48	24.17	.7
.8	2.72	5.43	8.15	10.86	13.58	16.30	19.01	21.73	24.44	.8
.9	2.75	5.49	8.24	10.99	13.73	16.48	19.23	21.98	24.72	.9
9.0	2.78	5.56	8.33	11.11	13.89	16.67	19.44	22.22	25.00	9.0
.1	2.81	5.62	8.43	11.23	14.04	16.85	19.66	22.47	25.28	.1
.2	2.84	5.68	8.52	11.36	14.20	17.04	19.88	22.72	25.56	.2
.3	2.87	5.74	8.61	11.48	14.35	17.22	20.09	22.96	25.83	.3
.4	2.90	5.80	8.70	11.60	14.51	17.41	20.31	23.21	26.11	.4
9.5	2.93	5.86	8.80	11.73	14.66	17.59	20.52	23.46	26.39	9.5
.6	2.96	5.93	8.89	11.85	14.81	17.78	20.74	23.70	26.67	.6
.7	2.99	5.99	8.98	11.98	14.97	17.96	20.96	23.95	26.94	.7
.8	3.02	6.05	9.07	12.10	15.12	18.15	21.17	24.20	27.22	.8
.9	3.06	6.11	9.17	12.22	15.28	18.33	21.39	24.44	27.50	.9
10.0	3.09	6.17	9.26	12.35	15.43	18.52	21.60	24.69	27.78	10.0
.1	3.12	6.23	9.35	12.47	15.59	18.70	21.82	24.94	28.06	.1
.2	3.15	6.30	9.44	12.59	15.74	18.89	22.04	25.19	28.33	.2
.3	3.18	6.36	9.54	12.72	15.90	19.07	22.25	25.43	28.61	.3
.4	3.21	6.42	9.63	12.84	16.05	19.26	22.47	25.68	28.89	.4
10.5	3.24	6.48	9.72	12.96	16.20	19.44	22.69	25.93	29.17	10.5
.6	3.27	6.54	9.81	13.09	16.36	19.63	22.90	26.17	29.44	.6
.7	3.30	6.60	9.91	13.21	16.51	19.81	23.12	26.42	29.72	.7
.8	3.33	6.67	10.00	13.33	16.67	20.00	23.33	26.67	30.00	.8
.9	3.36	6.73	10.09	13.46	16.82	20.19	23.55	26.91	30.28	.9
11.0	3.40	6.79	10.19	13.58	16.98	20.37	23.77	27.16	30.56	11.0
.1	3.43	6.85	10.28	13.70	17.13	20.56	23.98	27.41	30.83	.1
.2	3.46	6.91	10.37	13.83	17.28	20.74	24.20	27.65	31.11	.2
.3	3.49	6.98	10.46	13.95	17.44	20.93	24.41	27.90	31.39	.3
.4	3.52	7.04	10.56	14.07	17.59	21.11	24.63	28.15	31.67	.4
11.5	3.55	7.10	10.65	14.20	17.75	21.30	24.85	28.40	31.94	11.5
.6	3.58	7.16	10.74	14.32	17.90	21.48	25.06	28.64	32.22	.6
.7	3.61	7.22	10.83	14.44	18.06	21.67	25.28	28.89	32.50	.7
.8	3.64	7.28	10.93	14.57	18.21	21.85	25.49	29.14	32.78	.8
.9	3.67	7.35	11.02	14.69	18.36	22.04	25.71	29.38	33.06	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXXI.—PRISMOIDAL CORRECTION. CU. YDS. PER 100 FT.

c_0-c_1 D_0-D_1	1	2	3	4	5	6	7	8	9	c_0-c_1 D_0-D_1
12.0	3.70	7.41	11.11	14.81	18.52	22.22	25.93	29.63	33.33	12.0
.1	3.73	7.47	11.20	14.94	18.67	22.41	26.14	29.88	33.61	.1
.2	3.77	7.53	11.30	15.06	18.83	22.59	26.36	30.12	33.89	.2
.3	3.80	7.59	11.39	15.19	18.98	22.78	26.57	30.37	34.17	.3
.4	3.83	7.65	11.48	15.31	19.14	22.96	26.79	30.62	34.44	.4
12.5	3.86	7.72	11.57	15.43	19.29	23.15	27.01	30.86	34.72	12.5
.6	3.89	7.78	11.67	15.56	19.44	23.33	27.22	31.11	35.00	.6
.7	3.92	7.84	11.76	15.68	19.60	23.52	27.44	31.36	35.28	.7
.8	3.95	7.90	11.85	15.80	19.75	23.70	27.65	31.60	35.56	.8
.9	3.98	7.96	11.94	15.93	19.91	23.89	27.87	31.85	35.83	.9
13.0	4.01	8.02	12.04	16.05	20.06	24.07	28.09	32.10	36.11	13.0
.1	4.04	8.09	12.13	16.17	20.22	24.26	28.30	32.35	36.39	.1
.2	4.07	8.15	12.22	16.30	20.37	24.44	28.52	32.59	36.67	.2
.3	4.11	8.21	12.31	16.42	20.52	24.63	28.73	32.84	36.94	.3
.4	4.14	8.27	12.41	16.54	20.68	24.81	28.95	33.09	37.22	.4
13.5	4.17	8.33	12.50	16.67	20.83	25.00	29.17	33.33	37.50	13.5
.6	4.20	8.40	12.59	16.79	20.99	25.19	29.38	33.58	37.78	.6
.7	4.23	8.46	12.69	16.91	21.14	25.37	29.60	33.83	38.06	.7
.8	4.26	8.52	12.78	17.04	21.30	25.56	29.81	34.07	38.33	.8
.9	4.29	8.58	12.87	17.16	21.45	25.74	30.03	34.32	38.61	.9
14.0	4.32	8.64	12.96	17.28	21.60	25.93	30.25	34.57	38.89	14.0
.1	4.35	8.70	13.06	17.41	21.76	26.11	30.46	34.81	39.17	.1
.2	4.38	8.77	13.15	17.53	21.91	26.30	30.68	35.06	39.44	.2
.3	4.41	8.83	13.24	17.65	22.07	26.48	30.90	35.31	39.72	.3
.4	4.44	8.89	13.33	17.78	22.22	26.67	31.11	35.56	40.00	.4
14.5	4.48	8.95	13.43	17.90	22.38	26.85	31.33	35.80	40.28	14.5
.6	4.51	9.01	13.52	18.02	22.53	27.04	31.54	36.05	40.56	.6
.7	4.54	9.07	13.61	18.15	22.69	27.22	31.76	36.30	40.83	.7
.8	4.57	9.14	13.70	18.27	22.84	27.41	31.98	36.54	41.11	.8
.9	4.60	9.20	13.80	18.40	22.99	27.59	32.19	36.79	41.39	.9
15.0	4.63	9.26	13.89	18.52	23.15	27.78	32.41	37.04	41.67	15.0
.1	4.66	9.32	13.98	18.64	23.30	27.96	32.62	37.28	41.94	.1
.2	4.69	9.38	14.07	18.77	23.46	28.15	32.84	37.53	42.22	.2
.3	4.72	9.44	14.17	18.89	23.61	28.33	33.06	37.78	42.50	.3
.4	4.75	9.51	14.26	19.01	23.77	28.52	33.27	38.02	42.78	.4
15.5	4.78	9.57	14.35	19.14	23.92	28.70	33.49	38.27	43.06	15.5
.6	4.81	9.63	14.44	19.26	24.07	28.89	33.70	38.52	43.33	.6
.7	4.85	9.69	14.54	19.38	24.23	29.07	33.92	38.77	43.61	.7
.8	4.88	9.75	14.63	19.51	24.38	29.26	34.14	39.01	43.89	.8
.9	4.91	9.81	14.72	19.63	24.54	29.44	34.35	39.26	44.17	.9
16.0	4.94	9.88	14.81	19.75	24.69	29.63	34.57	39.51	44.44	16.0
.1	4.97	9.94	14.91	19.88	24.85	29.81	34.78	39.75	44.72	.1
.2	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	.2
.3	5.03	10.06	15.09	20.12	25.15	30.19	35.22	40.25	45.28	.3
.4	5.06	10.12	15.19	20.25	25.31	30.37	35.43	40.49	45.56	.4
16.5	5.09	10.19	15.28	20.37	25.46	30.56	35.65	40.74	45.83	16.5
.6	5.12	10.25	15.37	20.49	25.62	30.74	35.86	40.99	46.11	.6
.7	5.15	10.31	15.46	20.62	25.77	30.93	36.08	41.23	46.39	.7
.8	5.19	10.37	15.56	20.74	25.93	31.11	36.30	41.48	46.67	.8
.9	5.22	10.43	15.65	20.86	26.08	31.30	36.51	41.73	46.94	.9
17.0	5.25	10.49	15.74	20.99	26.23	31.48	36.73	41.98	47.22	17.0
.1	5.28	10.56	15.83	21.11	26.39	31.67	36.94	42.22	47.50	.1
.2	5.31	10.62	15.93	21.23	26.54	31.85	37.16	42.47	47.78	.2
.3	5.34	10.68	16.02	21.36	26.70	32.04	37.38	42.72	48.06	.3
.4	5.37	10.74	16.11	21.48	26.85	32.22	37.59	42.96	48.33	.4
17.5	5.40	10.80	16.20	21.60	27.01	32.41	37.81	43.21	48.61	17.5
.6	5.43	10.86	16.30	21.73	27.16	32.59	38.02	43.46	48.89	.6
.7	5.46	10.93	16.39	21.85	27.31	32.78	38.24	43.70	49.17	.7
.8	5.49	10.99	16.48	21.98	27.47	32.96	38.46	43.95	49.44	.8
.9	5.52	11.05	16.57	22.10	27.62	33.15	38.67	44.20	49.72	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXXI.—PRISMOIDAL CORRECTION. CU. YDS. PER 100 F

c_0-c_1	1	2	3	4	5	6	7	8	9	c_0-c_1
D_0-D_1										D_0-D_1
18.0	5.56	11.11	16.67	22.22	27.78	33.33	38.89	44.44	50.00	18.0
.1	5.59	11.17	16.76	22.35	27.93	33.52	39.10	44.69	50.28	.1
.2	5.62	11.23	16.85	22.47	28.09	33.70	39.32	44.94	50.56	.2
.3	5.65	11.30	16.94	22.59	28.24	33.89	39.54	45.19	50.83	.3
.4	5.68	11.36	17.04	22.72	28.40	34.07	39.75	45.43	51.11	.4
18.5	5.71	11.42	17.13	22.84	28.55	34.26	39.97	45.68	51.39	18.5
.6	5.74	11.48	17.22	22.96	28.70	34.44	40.19	45.93	51.67	.6
.7	5.77	11.54	17.31	23.09	28.86	34.63	40.40	46.17	51.94	.7
.8	5.80	11.60	17.41	23.21	29.01	34.81	40.62	46.42	52.22	.8
.9	5.83	11.67	17.50	23.33	29.17	35.00	40.83	46.67	52.50	.9
19.0	5.86	11.73	17.59	23.46	29.32	35.19	41.05	46.91	52.78	19.0
.1	5.90	11.79	17.69	23.58	29.48	35.37	41.27	47.16	53.06	.1
.2	5.93	11.85	17.78	23.70	29.63	35.56	41.48	47.41	53.33	.2
.3	5.96	11.91	17.87	23.83	29.78	35.74	41.70	47.65	53.61	.3
.4	5.99	11.98	17.96	23.95	29.94	35.93	41.91	47.90	53.89	.4
19.5	6.02	12.04	18.06	24.07	30.09	36.11	42.13	48.15	54.17	19.5
.6	6.05	12.10	18.15	24.20	30.25	36.30	42.35	48.40	54.44	.6
.7	6.08	12.16	18.24	24.32	30.40	36.48	42.56	48.64	54.72	.7
.8	6.11	12.22	18.33	24.44	30.56	36.67	42.78	48.89	55.00	.8
.9	6.14	12.28	18.43	24.57	30.71	36.85	42.99	49.14	55.28	.9
20.0	6.17	12.35	18.52	24.69	30.86	37.04	43.21	49.38	55.56	20.0
.1	6.20	12.41	18.61	24.81	31.02	37.22	43.43	49.63	55.83	.1
.2	6.23	12.47	18.70	24.94	31.17	37.41	43.64	49.88	56.11	.2
.3	6.27	12.53	18.80	25.06	31.33	37.59	43.86	50.12	56.39	.3
.4	6.30	12.59	18.89	25.19	31.48	37.78	44.07	50.37	56.67	.4
20.5	6.33	12.65	18.98	25.31	31.64	37.96	44.29	50.62	56.94	20.5
.6	6.36	12.72	19.07	25.43	31.79	38.15	44.51	50.86	57.22	.6
.7	6.39	12.78	19.17	25.56	31.94	38.33	44.72	51.11	57.50	.7
.8	6.42	12.84	19.26	25.68	32.10	38.52	44.94	51.36	57.78	.8
.9	6.45	12.90	19.35	25.80	32.25	38.70	45.15	51.60	58.06	.9
21.0	6.48	12.96	19.44	25.93	32.41	38.89	45.37	51.85	58.33	21.0
.1	6.51	13.02	19.54	26.05	32.56	39.07	45.59	52.10	58.61	.1
.2	6.54	13.09	19.63	26.17	32.72	39.26	45.80	52.35	58.89	.2
.3	6.57	13.15	19.72	26.30	32.87	39.44	46.02	52.59	59.17	.3
.4	6.60	13.21	19.81	26.42	33.02	39.63	46.23	52.84	59.44	.4
21.5	6.64	13.27	19.91	26.54	33.18	39.81	46.45	53.09	59.72	21.5
.6	6.67	13.33	20.00	26.67	33.33	40.00	46.67	53.33	60.00	.6
.7	6.70	13.40	20.09	26.79	33.49	40.19	46.88	53.58	60.28	.7
.8	6.73	13.46	20.19	26.91	33.64	40.37	47.10	53.83	60.56	.8
.9	6.76	13.52	20.28	27.04	33.80	40.56	47.31	54.07	60.83	.9
22.0	6.79	13.58	20.37	27.16	33.95	40.74	47.53	54.32	61.11	22.0
.1	6.82	13.64	20.46	27.28	34.10	40.93	47.75	54.57	61.39	.1
.2	6.85	13.70	20.56	27.41	34.26	41.11	47.96	54.81	61.67	.2
.3	6.88	13.77	20.65	27.53	34.41	41.30	48.18	55.06	61.94	.3
.4	6.91	13.83	20.74	27.65	34.57	41.48	48.40	55.31	62.22	.4
22.5	6.94	13.89	20.83	27.78	34.72	41.67	48.61	55.56	62.50	22.5
.6	6.98	13.95	20.93	27.90	34.88	41.85	48.83	55.80	62.78	.6
.7	7.01	14.01	21.02	28.02	35.03	42.04	49.04	56.05	63.06	.7
.8	7.04	14.07	21.11	28.15	35.19	42.22	49.26	56.30	63.33	.8
.9	7.07	14.14	21.20	28.27	35.34	42.41	49.48	56.54	63.61	.9
23.0	7.10	14.20	21.30	28.40	35.49	42.59	49.69	56.79	63.89	23.0
.1	7.13	14.26	21.39	28.52	35.65	42.78	49.91	57.04	64.17	.1
.2	7.16	14.32	21.48	28.64	35.80	42.96	50.12	57.28	64.44	.2
.3	7.19	14.38	21.57	28.77	35.96	43.15	50.34	57.53	64.72	.3
.4	7.22	14.44	21.67	28.89	36.11	43.33	50.56	57.78	65.00	.4
23.5	7.25	14.51	21.76	29.01	36.27	43.52	50.77	58.02	65.28	23.5
.6	7.28	14.57	21.85	29.14	36.42	43.70	50.99	58.27	65.56	.6
.7	7.31	14.63	21.94	29.26	36.57	43.89	51.20	58.52	65.83	.7
.8	7.35	14.69	22.04	29.38	36.73	44.07	51.42	58.77	66.11	.8
.9	7.38	14.75	22.13	29.51	36.88	44.26	51.64	59.01	66.39	.9
	1	2	3	4	5	6	7	8	9	

TABLE XXXII.—BASE 14; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	6.5	2.6	6.6	5.3	6.8	8.0	6.9	10.8	7.0	13.7	7.2	16.6	7.3	19.5	7.5	22.5	7.6	25.6	7.7	0
1	28.7	7.9	31.9	8.0	35.1	8.1	38.4	8.3	41.7	8.4	45.1	8.6	48.6	8.7	52.1	8.8	55.7	9.0	59.3	9.1	1
2	63.0	9.3	66.7	9.4	70.5	9.5	74.3	9.7	78.2	9.8	82.2	10.0	86.2	10.1	90.3	10.2	94.4	10.4	98.5	10.5	2
3	102.8	10.6	107.1	10.8	111.4	10.9	115.8	11.1	120.3	11.2	124.8	11.3	129.3	11.5	134.0	11.6	138.6	11.8	143.4	11.9	3
4	148.1	12.0	153.0	12.2	157.9	12.3	162.8	12.5	167.9	12.6	172.9	12.7	178.0	12.9	183.2	13.0	188.4	13.1	193.7	13.3	4
5	199.1	13.4	204.5	13.6	209.9	13.7	215.4	13.8	221.0	14.0	226.6	14.1	232.3	14.3	238.0	14.4	243.8	14.5	249.7	14.7	5
6	255.6	14.8	261.5	15.0	267.5	15.1	273.6	15.2	279.7	15.4	285.9	15.5	292.1	15.6	298.4	15.8	304.7	15.9	311.1	16.1	6
7	317.6	16.2	324.1	16.3	330.7	16.5	337.3	16.6	344.0	16.8	350.7	16.9	357.5	17.0	364.3	17.2	371.2	17.3	378.2	17.5	7
8	385.2	17.6	392.3	17.7	399.4	17.9	406.5	18.0	413.8	18.1	421.1	18.3	428.4	18.4	435.8	18.6	443.3	18.7	450.8	18.8	8
9	458.3	19.0	466.0	19.1	473.6	19.3	481.4	19.4	489.1	19.5	497.0	19.7	504.9	19.8	512.8	20.0	520.9	20.1	528.9	20.2	9
10	537.0	20.4	545.2	20.5	553.4	20.6	561.7	20.8	570.1	20.9	578.5	21.1	586.9	21.2	595.4	21.3	604.0	21.5	612.6	21.6	10
11	621.3	21.8	630.0	21.9	638.8	22.0	647.7	22.2	656.6	22.3	665.5	22.5	674.5	22.6	683.6	22.7	692.7	22.9	701.9	23.0	11
12	711.1	23.1	720.4	23.3	729.7	23.4	739.1	23.6	748.6	23.7	758.1	23.8	767.7	24.0	777.3	24.1	787.0	24.3	796.7	24.4	12
13	806.5	24.5	816.3	24.7	826.2	24.8	836.2	25.0	846.2	25.1	856.3	25.2	866.4	25.4	876.5	25.5	886.8	25.6	897.1	25.8	13
14	907.4	25.9	917.8	26.1	928.3	26.2	938.8	26.3	949.3	26.5	960.0	26.6	970.6	26.8	981.4	26.9	992.1	27.0	1003.0	27.2	14
15	1013.9	27.3	1024.8	27.5	1035.9	27.6	1046.9	27.7	1058.0	27.9	1069.2	28.0	1080.4	28.1	1091.7	28.3	1103.1	28.4	1114.5	28.6	15
16	1125.9	28.7	1137.4	28.8	1149.0	29.0	1160.6	29.1	1172.3	29.3	1184.0	29.4	1195.8	29.5	1207.7	29.7	1219.6	29.8	1231.5	30.0	16
17	1243.5	30.1	1255.6	30.2	1267.7	30.4	1279.9	30.5	1292.1	30.6	1304.4	30.8	1316.7	30.9	1329.1	31.1	1341.6	31.2	1354.1	31.3	17
18	1366.7	31.5	1379.3	31.6	1392.0	31.8	1404.7	31.9	1417.5	32.0	1430.3	32.2	1443.2	32.3	1456.2	32.5	1469.2	32.6	1482.3	32.7	18
19	1495.4	32.9	1508.5	33.0	1521.8	33.1	1535.1	33.3	1548.4	33.4	1561.8	33.6	1575.3	33.7	1588.8	33.8	1602.3	34.0	1616.0	34.1	19
20	1629.6	34.3	1643.4	34.4	1657.1	34.5	1671.0	34.7	1684.9	34.8	1698.8	35.0	1712.9	35.1	1726.9	35.2	1741.0	35.4	1755.2	35.5	20
21	1769.4	35.6	1783.7	35.8	1798.1	35.9	1812.5	36.1	1826.9	36.2	1841.4	36.3	1856.0	36.5	1870.6	36.6	1885.3	36.8	1900.0	36.9	21
22	1914.8	37.0	1929.7	37.2	1944.6	37.3	1959.5	37.5	1974.5	37.6	1989.6	37.7	2004.7	37.9	2019.9	38.0	2035.1	38.1	2050.4	38.3	22
23	2065.7	38.4	2081.1	38.6	2096.6	38.7	2112.1	38.8	2127.7	39.0	2143.3	39.1	2159.0	39.3	2174.7	39.4	2190.5	39.5	2206.3	39.7	23
24	2222.2	39.8	2238.2	40.0	2254.2	40.1	2270.3	40.2	2286.4	40.4	2302.5	40.5	2318.8	40.6	2335.1	40.8	2351.4	40.9	2367.8	41.1	24
25	2384.3	41.2	2400.8	41.3	2417.3	41.5	2434.0	41.6	2450.6	41.8	2467.4	41.9	2484.1	42.0	2501.0	42.2	2517.9	42.3	2534.8	42.5	25
26	2551.9	42.6	2568.9	42.7	2586.0	42.9	2603.2	43.0	2620.4	43.1	2637.7	43.3	2655.1	43.4	2672.5	43.6	2689.9	43.7	2707.4	43.8	26
27	2725.0	44.0	2742.6	44.1	2760.3	44.3	2778.0	44.4	2795.8	44.5	2813.7	44.7	2831.6	44.8	2849.5	45.0	2867.5	45.1	2885.6	45.2	27
28	2903.7	45.4	2921.9	45.5	2940.1	45.6	2958.4	45.8	2976.7	45.9	2995.1	46.1	3013.6	46.2	3032.1	46.3	3050.7	46.5	3069.3	46.6	28
29	3088.0	46.8	3106.7	46.9	3125.5	47.0	3144.3	47.2	3163.2	47.3	3182.2	47.5	3201.2	47.6	3220.3	47.7	3239.4	47.9	3258.5	48.0	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 15; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	c
0	0.0	6.9	2.8	7.1	5.7	7.2	8.6	7.4	11.6	7.5	14.6	7.6	17.7	7.8	20.8	7.9	24.0	8.1	27.2	8.2	0
1	30.6	8.3	33.9	8.5	37.3	8.6	40.8	8.8	44.3	8.9	47.9	9.0	51.6	9.2	55.2	9.3	59.0	9.4	62.8	9.6	1
2	66.7	9.7	70.6	9.9	74.6	10.0	78.6	10.1	82.7	10.3	86.8	10.4	91.0	10.6	95.2	10.7	99.6	10.8	103.9	11.0	2
3	108.3	11.1	112.8	11.2	117.3	11.4	121.9	11.5	126.6	11.7	131.2	11.8	136.0	11.9	140.8	12.1	145.7	12.2	150.6	12.4	3
4	155.6	12.5	160.6	12.6	165.7	12.8	170.8	12.9	176.0	13.1	181.2	13.2	186.6	13.3	191.9	13.5	197.3	13.6	202.8	13.8	4
5	208.3	13.9	213.9	14.0	219.6	14.2	225.2	14.3	231.0	14.4	236.8	14.6	242.7	14.7	248.6	14.9	254.6	15.0	260.6	15.1	5
6	266.7	15.3	272.8	15.4	279.0	15.6	285.2	15.7	291.6	15.8	297.9	16.0	304.3	16.1	310.8	16.2	317.3	16.4	323.9	16.5	6
7	330.6	16.7	337.2	16.8	344.0	16.9	350.8	17.1	357.7	17.2	364.6	17.4	371.6	17.5	378.6	17.6	385.7	17.8	392.8	17.9	7
8	400.0	18.1	407.2	18.2	414.6	18.3	421.9	18.5	429.3	18.6	436.8	18.8	444.3	18.9	451.9	19.0	459.6	19.2	467.2	19.3	8
9	475.0	19.4	482.8	19.6	490.7	19.7	498.6	19.9	506.6	20.0	514.6	20.1	522.7	20.3	530.8	20.4	539.0	20.6	547.2	20.7	9
10	555.6	20.8	563.9	21.0	572.3	21.1	580.8	21.2	589.3	21.4	597.9	21.5	606.6	21.7	615.2	21.8	624.0	21.9	632.8	22.1	10
11	641.7	22.2	650.6	22.4	659.6	22.5	668.6	22.6	677.7	22.8	686.8	22.9	696.0	23.1	705.2	23.2	714.6	23.3	723.9	23.5	11
12	733.3	23.6	742.8	23.8	752.3	23.9	761.9	24.0	771.6	24.2	781.2	24.3	791.0	24.4	800.8	24.6	810.7	24.7	820.6	24.9	12
13	830.6	25.0	840.6	25.1	850.7	25.3	860.8	25.4	871.0	25.6	881.2	25.7	891.6	25.8	901.9	26.0	912.3	26.1	922.8	26.2	13
14	933.3	26.4	943.9	26.5	954.6	26.7	965.2	26.8	976.0	26.9	986.8	27.1	997.7	27.2	1008.6	27.4	1019.6	27.5	1030.6	27.6	14
15	1041.7	27.8	1052.8	27.9	1064.0	28.1	1075.2	28.2	1086.6	28.3	1097.9	28.5	1109.3	28.6	1120.8	28.8	1132.3	28.9	1143.9	29.0	15
16	1155.6	29.2	1167.2	29.3	1179.0	29.4	1190.8	29.6	1202.7	29.7	1214.6	29.9	1226.6	30.0	1238.6	30.1	1250.7	30.3	1262.8	30.4	16
17	1275.0	30.6	1287.2	30.7	1299.6	30.8	1311.9	31.0	1324.3	31.1	1336.8	31.2	1349.3	31.4	1361.9	31.5	1374.6	31.7	1387.2	31.8	17
18	1400.0	31.9	1412.8	32.1	1425.7	32.2	1438.6	32.4	1451.6	32.5	1464.6	32.6	1477.7	32.8	1490.8	32.9	1504.0	33.1	1517.2	33.2	18
19	1530.6	33.3	1543.9	33.5	1557.3	33.6	1570.8	33.8	1584.3	33.9	1597.9	34.0	1611.6	34.2	1625.2	34.3	1639.0	34.4	1652.8	34.6	19
20	1666.7	34.7	1680.6	34.9	1694.6	35.0	1708.6	35.1	1722.7	35.3	1736.8	35.4	1751.0	35.6	1765.2	35.7	1779.6	35.8	1793.9	36.0	20
21	1808.3	36.1	1822.8	36.2	1837.3	36.4	1851.9	36.5	1866.6	36.7	1881.2	36.8	1896.0	36.9	1910.8	37.1	1925.7	37.2	1940.6	37.4	21
22	1955.6	37.5	1970.6	37.6	1985.7	37.8	2000.8	37.9	2016.0	38.1	2031.2	38.2	2046.6	38.3	2061.9	38.5	2077.3	38.6	2092.8	38.8	22
23	2108.3	38.9	2123.9	39.0	2139.6	39.2	2155.2	39.3	2171.0	39.4	2186.8	39.6	2202.7	39.7	2218.6	39.9	2234.6	40.0	2250.6	40.1	23
24	2266.7	40.3	2282.8	40.4	2299.0	40.6	2315.2	40.7	2331.6	40.8	2347.9	41.0	2364.3	41.1	2380.8	41.2	2397.3	41.4	2413.9	41.5	24
25	2430.6	41.7	2447.2	41.8	2464.0	41.9	2480.8	42.1	2497.7	42.2	2514.6	42.4	2531.6	42.5	2548.6	42.6	2565.7	42.8	2582.8	42.9	25
26	2600.0	43.1	2617.2	43.2	2634.6	43.3	2651.9	43.5	2669.3	43.6	2686.8	43.8	2704.3	43.9	2721.9	44.0	2739.6	44.2	2757.2	44.3	26
27	2775.0	44.4	2792.8	44.6	2810.7	44.7	2828.6	44.9	2846.6	45.0	2864.6	45.1	2882.7	45.3	2900.8	45.4	2919.0	45.6	2937.2	45.7	27
28	2955.6	45.8	2973.9	46.0	2992.3	46.1	3010.8	46.2	3029.3	46.4	3047.9	46.5	3066.6	46.7	3085.2	46.8	3104.0	46.9	3122.8	47.1	28
29	3141.7	47.2	3160.6	47.4	3179.6	47.5	3198.6	47.6	3217.7	47.8	3236.8	47.9	3256.0	48.1	3275.2	48.2	3294.6	48.3	3313.9	48.5	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 16; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	7.4	3.0	7.5	6.0	7.7	9.1	7.8	12.3	8.0	15.5	8.1	18.8	8.2	22.1	8.4	25.5	8.5	28.9	8.7	0
1	32.4	8.8	36.0	8.9	39.6	9.1	43.2	9.2	46.9	9.4	50.7	9.5	54.5	9.6	58.4	9.8	62.3	9.9	66.3	10.0	1
2	70.4	10.2	74.5	10.3	78.6	10.5	82.8	10.6	87.1	10.7	91.4	10.9	95.8	11.0	100.2	11.2	104.7	11.3	109.3	11.4	2
3	113.9	11.6	118.5	11.7	123.3	11.9	128.0	12.0	132.9	12.1	137.7	12.3	142.7	12.4	147.7	12.5	152.7	12.7	157.8	12.8	3
4	163.0	13.0	168.2	13.1	173.4	13.2	178.8	13.4	184.1	13.5	189.6	13.7	195.1	13.8	200.6	13.9	206.2	14.1	211.9	14.2	4
5	217.6	14.4	223.4	14.5	229.2	14.6	235.1	14.8	241.0	14.9	247.0	15.0	253.0	15.2	259.1	15.3	265.3	15.5	271.5	15.6	5
6	277.8	15.7	284.1	15.9	290.5	16.0	296.9	16.2	303.4	16.3	310.0	16.4	316.6	16.6	323.2	16.7	329.9	16.9	336.7	17.0	6
7	343.5	17.1	350.4	17.3	357.3	17.4	364.3	17.5	371.4	17.7	378.5	17.8	385.6	18.0	392.8	18.1	400.1	18.2	407.4	18.4	7
8	414.8	18.5	422.2	18.7	429.7	18.8	437.3	18.9	444.9	19.1	452.5	19.2	460.3	19.4	468.0	19.5	475.9	19.6	483.7	19.8	8
9	491.7	19.9	499.7	20.0	507.7	20.2	515.8	20.3	524.0	20.5	532.2	20.6	540.4	20.7	548.8	20.9	557.1	21.0	565.6	21.2	9
10	574.1	21.3	582.6	21.4	591.2	21.6	599.9	21.7	608.6	21.9	617.4	22.0	626.2	22.1	635.1	22.3	644.0	22.4	653.0	22.5	10
11	662.0	22.7	671.1	22.8	680.3	23.0	689.5	23.1	698.8	23.2	708.1	23.4	717.5	23.5	726.9	23.7	736.4	23.8	746.0	23.9	11
12	755.6	24.1	765.2	24.2	774.9	24.4	784.7	24.5	794.5	24.6	804.4	24.8	814.3	24.9	824.3	25.0	834.4	25.2	844.5	25.3	12
13	854.6	25.5	864.8	25.6	875.1	25.7	885.4	25.9	895.8	26.0	906.2	26.2	916.7	26.3	927.3	26.4	937.9	26.6	948.5	26.7	13
14	959.3	26.9	970.0	27.0	980.9	27.1	991.7	27.3	1002.7	27.4	1013.7	27.5	1024.7	27.7	1035.8	27.8	1047.0	28.0	1058.2	28.1	14
15	1069.4	28.2	1080.8	28.4	1092.1	28.5	1103.6	28.7	1115.1	28.8	1126.6	28.9	1138.2	29.1	1149.9	29.2	1161.6	29.4	1173.4	29.5	15
16	1185.2	29.6	1197.1	29.8	1209.0	29.9	1221.0	30.0	1233.0	30.2	1245.1	30.3	1257.3	30.5	1269.5	30.6	1281.8	30.7	1294.1	30.9	16
17	1306.5	31.0	1318.9	31.2	1331.4	31.3	1344.0	31.4	1356.6	31.6	1369.2	31.7	1381.9	31.9	1394.7	32.0	1407.5	32.1	1420.4	32.3	17
18	1433.3	32.4	1446.3	32.5	1459.4	32.7	1472.5	32.8	1485.6	33.0	1498.8	33.1	1512.1	33.2	1525.4	33.4	1538.8	33.5	1552.2	33.7	18
19	1565.7	33.8	1579.3	33.9	1592.9	34.1	1606.5	34.2	1620.3	34.4	1634.0	34.5	1647.9	34.6	1661.7	34.8	1675.7	34.9	1689.7	35.0	19
20	1703.7	35.2	1717.8	35.3	1732.0	35.5	1746.2	35.6	1760.4	35.7	1774.8	35.9	1789.1	36.0	1803.6	36.2	1818.1	36.3	1832.6	36.4	20
21	1847.2	36.6	1861.9	36.7	1876.6	36.9	1891.4	37.0	1906.2	37.1	1921.1	37.3	1936.0	37.4	1951.0	37.5	1966.0	37.7	1981.1	37.8	21
22	1996.3	38.0	2011.5	38.1	2026.8	38.2	2042.1	38.4	2057.5	38.5	2072.9	38.7	2088.4	38.8	2104.0	38.9	2119.6	39.1	2135.2	39.2	22
23	2150.9	39.4	2166.7	39.5	2182.5	39.6	2198.4	39.8	2214.3	39.9	2230.3	40.0	2246.4	40.2	2262.5	40.3	2278.6	40.5	2294.8	40.6	23
24	2311.1	40.7	2327.4	40.9	2343.8	41.0	2360.2	41.2	2376.7	41.3	2393.3	41.4	2409.9	41.6	2426.5	41.7	2443.3	41.9	2460.0	42.0	24
25	2476.9	42.1	2493.7	42.3	2510.7	42.4	2527.7	42.5	2544.7	42.7	2561.8	42.8	2579.0	43.0	2596.2	43.1	2613.4	43.2	2630.8	43.4	25
26	2648.1	43.5	2665.6	43.7	2683.1	43.8	2700.6	43.9	2718.2	44.1	2735.9	44.2	2753.6	44.4	2771.4	44.5	2789.2	44.6	2807.1	44.8	26
27	2825.0	44.9	2843.0	45.0	2861.0	45.2	2879.1	45.3	2897.3	45.5	2915.5	45.6	2933.8	45.7	2952.1	45.9	2970.5	46.0	2988.9	46.2	27
28	3007.4	46.3	3026.0	46.4	3044.6	46.6	3063.2	46.7	3081.9	46.9	3100.7	47.0	3119.5	47.1	3138.4	47.3	3157.3	47.4	3176.3	47.5	28
29	3195.4	47.7	3214.5	47.8	3233.6	48.0	3252.8	48.1	3272.1	48.2	3291.4	48.4	3310.8	48.5	3330.2	48.7	3349.7	48.8	3369.3	48.9	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 18; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	8.3	3.4	8.5	6.8	8.6	10.2	8.8	13.8	8.9	17.4	9.0	21.0	9.2	24.7	9.3	28.4	9.4	32.2	9.6	0
1	36.1	9.7	40.0	9.9	44.0	10.0	48.0	10.1	52.1	10.3	56.2	10.4	60.4	10.6	64.7	10.7	69.0	10.8	73.4	11.0	1
2	77.8	11.1	82.2	11.2	86.8	11.4	91.4	11.5	96.0	11.7	100.7	11.8	105.4	11.9	110.2	12.1	115.1	12.2	120.0	12.4	2
3	125.0	12.5	130.0	12.6	135.1	12.8	140.2	12.9	145.4	13.1	150.7	13.2	156.0	13.3	161.4	13.5	166.8	13.6	172.2	13.8	3
4	177.8	13.9	183.4	14.0	189.0	14.2	194.7	14.3	200.4	14.4	206.2	14.6	212.1	14.7	218.0	14.9	224.0	15.0	230.0	15.1	4
5	236.1	15.3	242.2	15.4	248.4	15.6	254.7	15.7	261.0	15.8	267.4	16.0	273.8	16.1	280.2	16.2	286.8	16.4	293.4	16.5	5
6	300.0	16.7	306.7	16.8	313.4	16.9	320.2	17.1	327.1	17.2	334.0	17.4	341.0	17.5	348.0	17.6	355.1	17.8	362.2	17.9	6
7	369.4	18.1	376.7	18.2	384.0	18.3	391.4	18.5	398.8	18.6	406.2	18.8	413.8	18.9	421.4	19.0	429.0	19.2	436.7	19.3	7
8	444.4	19.4	452.2	19.6	460.1	19.7	468.0	19.9	476.0	20.0	484.0	20.1	492.1	20.3	500.2	20.4	508.4	20.6	516.7	20.7	8
9	525.0	20.8	533.4	21.0	541.8	21.1	550.2	21.2	558.8	21.4	567.4	21.5	576.0	21.7	584.7	21.8	593.4	21.9	602.2	22.1	9
10	611.1	22.2	620.0	22.4	629.0	22.5	638.0	22.6	647.1	22.8	656.2	22.9	665.4	23.1	674.7	23.2	684.0	23.3	693.4	23.5	10
11	702.8	23.6	712.2	23.8	721.8	23.9	731.4	24.0	741.0	24.2	750.7	24.3	760.4	24.4	770.2	24.6	780.1	24.7	790.0	24.9	11
12	800.0	25.0	810.0	25.1	820.1	25.3	830.2	25.4	840.4	25.6	850.7	25.7	861.0	25.8	871.4	26.0	881.8	26.1	892.2	26.2	12
13	902.8	26.4	913.4	26.5	924.0	26.7	934.7	26.8	945.4	26.9	956.2	27.1	967.1	27.2	978.0	27.4	989.0	27.5	1000.0	27.6	13
14	1011.1	27.8	1022.2	27.9	1033.4	28.1	1044.7	28.2	1056.0	28.3	1067.4	28.5	1078.8	28.6	1090.2	28.8	1101.8	28.9	1113.4	29.0	14
15	1125.0	29.2	1136.7	29.3	1148.4	29.4	1160.2	29.6	1172.1	29.7	1184.0	29.9	1196.0	30.0	1208.0	30.1	1220.1	30.3	1232.2	30.4	15
16	1244.4	30.6	1256.7	30.7	1269.0	30.8	1281.4	31.0	1293.8	31.1	1306.2	31.2	1318.8	31.4	1331.4	31.5	1344.0	31.7	1356.7	31.8	16
17	1369.4	31.9	1382.2	32.1	1395.1	32.2	1408.0	32.4	1421.0	32.5	1434.0	32.6	1447.1	32.8	1460.2	32.9	1473.4	33.1	1486.7	33.2	17
18	1500.0	33.3	1513.4	33.5	1526.8	33.6	1540.2	33.8	1553.8	33.9	1567.4	34.0	1581.0	34.2	1594.7	34.3	1608.4	34.4	1622.2	34.6	18
19	1636.1	34.7	1650.0	34.9	1664.0	35.0	1678.0	35.1	1692.1	35.3	1706.2	35.4	1720.4	35.6	1734.7	35.7	1749.0	35.8	1763.4	36.0	19
20	1777.8	36.1	1792.2	36.2	1806.8	36.4	1821.4	36.5	1836.0	36.7	1850.7	36.8	1865.4	36.9	1880.2	37.1	1895.1	37.2	1910.0	37.4	20
21	1925.0	37.5	1940.0	37.6	1955.1	37.8	1970.2	37.9	1985.4	38.1	2000.7	38.2	2016.0	38.3	2031.4	38.5	2046.8	38.6	2062.2	38.8	21
22	2077.8	38.9	2093.4	39.0	2109.0	39.2	2124.7	39.3	2140.4	39.4	2156.2	39.6	2172.1	39.7	2188.0	39.9	2204.0	40.0	2220.0	40.1	22
23	2236.1	40.3	2252.2	40.4	2268.4	40.6	2284.7	40.7	2301.0	40.8	2317.4	41.0	2333.8	41.1	2350.2	41.2	2366.8	41.4	2383.4	41.5	23
24	2400.0	41.7	2416.7	41.8	2433.4	41.9	2450.2	42.1	2467.1	42.2	2484.0	42.4	2501.0	42.5	2518.0	42.6	2535.1	42.8	2552.2	42.9	24
25	2569.4	43.1	2586.7	43.2	2604.0	43.3	2621.4	43.5	2638.8	43.6	2656.2	43.8	2673.8	43.9	2691.4	44.0	2709.0	44.2	2726.7	44.3	25
26	2744.4	44.4	2762.2	44.6	2780.1	44.7	2798.0	44.9	2816.0	45.0	2834.0	45.1	2852.1	45.3	2870.2	45.4	2888.4	45.6	2906.7	45.7	26
27	2925.0	45.8	2943.4	46.0	2961.8	46.1	2980.2	46.2	2998.8	46.4	3017.4	46.5	3036.0	46.7	3054.7	46.8	3073.4	46.9	3092.2	47.1	27
28	3111.1	47.2	3130.0	47.4	3149.0	47.5	3168.0	47.6	3187.1	47.8	3206.2	47.9	3225.4	48.1	3244.7	48.2	3264.0	48.3	3283.4	48.5	28
29	3302.8	48.6	3322.2	48.8	3341.8	48.9	3361.4	49.0	3381.0	49.2	3400.7	49.3	3420.4	49.4	3440.2	49.6	3460.1	49.7	3480.0	49.9	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 20; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	9.3	3.7	9.4	7.5	9.5	11.4	9.7	15.3	9.8	19.2	10.0	23.2	10.1	27.3	10.2	31.4	10.4	35.6	10.5	0
1	39.8	10.6	44.1	10.8	48.4	10.9	52.8	11.1	57.3	11.2	61.8	11.3	66.4	11.5	71.0	11.6	75.7	11.8	80.4	11.9	1
2	85.2	12.0	90.0	12.2	94.9	12.3	99.9	12.5	104.9	12.6	110.0	12.7	115.1	12.9	120.2	13.0	125.5	13.1	130.8	13.3	2
3	136.1	13.4	141.5	13.6	147.0	13.7	152.5	13.8	158.0	14.0	163.7	14.1	169.3	14.3	175.1	14.4	180.9	14.5	186.7	14.7	3
4	192.6	14.8	198.5	15.0	204.6	15.1	210.6	15.2	216.7	15.4	222.9	15.5	229.1	15.6	235.4	15.8	241.8	15.9	248.2	16.1	4
5	254.6	16.2	261.1	16.3	267.7	16.5	274.3	16.6	281.0	16.8	287.7	16.9	294.5	17.0	301.4	17.2	308.3	17.3	315.2	17.5	5
6	322.2	17.6	329.3	17.7	336.4	17.9	343.6	18.0	350.8	18.1	358.1	18.3	365.4	18.4	372.8	18.6	380.3	18.7	387.8	18.8	6
7	395.4	19.0	403.0	19.1	410.7	19.3	418.4	19.4	426.2	19.5	434.0	19.7	441.9	19.8	449.9	20.0	457.9	20.1	466.0	20.2	7
8	474.1	20.4	482.2	20.5	490.5	20.6	498.8	20.8	507.1	20.9	515.5	21.1	524.0	21.2	532.5	21.3	541.0	21.5	549.7	21.6	8
9	558.3	21.8	567.1	21.9	575.9	22.0	584.7	22.2	593.6	22.3	602.5	22.5	611.6	22.6	620.6	22.7	629.7	22.9	638.9	23.0	9
10	648.1	23.1	657.4	23.3	666.8	23.4	676.2	23.6	685.6	23.7	695.1	23.8	704.7	24.0	714.3	24.1	724.0	24.3	733.7	24.4	10
11	743.5	24.5	753.4	24.7	763.3	24.8	773.2	25.0	783.2	25.1	793.3	25.2	803.4	25.4	813.6	25.5	823.8	25.6	834.1	25.8	11
12	844.4	25.9	854.8	26.1	865.3	26.2	875.8	26.3	886.4	26.5	897.0	26.6	907.7	26.8	918.4	26.9	929.2	27.0	940.0	27.2	12
13	950.9	27.3	961.9	27.5	972.9	27.6	984.0	27.7	995.1	27.9	1006.2	28.0	1017.5	28.1	1028.8	28.3	1040.1	28.4	1051.5	28.6	13
14	1063.0	28.7	1074.5	28.8	1086.0	29.0	1097.7	29.1	1109.3	29.3	1121.1	29.4	1132.9	29.5	1144.7	29.7	1156.6	29.8	1168.5	30.0	14
15	1180.6	30.1	1192.6	30.2	1204.7	30.4	1216.9	30.5	1229.1	30.6	1241.4	30.8	1253.8	30.9	1266.2	31.1	1278.6	31.2	1291.1	31.3	15
16	1303.7	31.5	1316.3	31.6	1329.0	31.8	1341.7	31.9	1354.5	32.0	1367.4	32.2	1380.3	32.3	1393.2	32.5	1406.2	32.6	1419.3	32.7	16
17	1432.4	32.9	1445.6	33.0	1458.8	33.1	1472.1	33.3	1485.4	33.4	1498.8	33.6	1512.3	33.7	1525.8	33.8	1539.4	34.0	1553.0	34.1	17
18	1566.7	34.3	1580.4	34.4	1594.2	34.5	1608.0	34.7	1621.9	34.8	1635.9	35.0	1649.9	35.1	1664.0	35.2	1678.1	35.4	1692.2	35.5	18
19	1706.5	35.6	1720.8	35.8	1735.1	35.9	1749.5	36.1	1764.0	36.2	1778.5	36.3	1793.0	36.5	1807.7	36.6	1822.3	36.8	1837.1	36.9	19
20	1851.9	37.0	1866.7	37.2	1881.6	37.3	1896.5	37.5	1911.6	37.6	1926.6	37.7	1941.7	37.9	1956.9	38.0	1972.1	38.1	1987.4	38.3	20
21	2002.8	38.4	2018.2	38.6	2033.6	38.7	2049.1	38.8	2064.7	39.0	2080.3	39.1	2096.0	39.3	2111.7	39.4	2127.5	39.5	2143.4	39.7	21
22	2159.3	39.8	2175.2	40.0	2191.2	40.1	2207.3	40.2	2223.4	40.4	2239.6	40.5	2255.8	40.6	2272.1	40.8	2288.4	40.9	2304.8	41.1	22
23	2321.3	41.2	2337.8	41.3	2354.4	41.5	2371.0	41.6	2387.7	41.8	2404.4	41.9	2421.2	42.0	2438.0	42.2	2454.9	42.3	2471.9	42.5	23
24	2488.9	42.6	2506.0	42.7	2523.1	42.9	2540.2	43.0	2557.5	43.1	2574.8	43.3	2592.1	43.4	2609.5	43.6	2627.0	43.7	2644.5	43.8	24
25	2662.0	44.0	2679.7	44.1	2697.3	44.3	2715.1	44.4	2732.9	44.5	2750.7	44.7	2768.6	44.8	2786.5	45.0	2804.6	45.1	2822.6	45.2	25
26	2840.7	45.4	2858.9	45.5	2877.1	45.6	2895.4	45.8	2913.8	45.9	2932.2	46.1	2950.6	46.2	2969.1	46.3	2987.7	46.5	3006.3	46.6	26
27	3025.0	46.8	3043.7	46.9	3062.5	47.0	3081.4	47.2	3100.3	47.3	3119.2	47.5	3138.2	47.6	3157.3	47.7	3176.4	47.9	3195.6	48.0	27
28	3214.8	48.1	3234.1	48.3	3253.4	48.4	3272.8	48.6	3292.3	48.7	3311.8	48.8	3331.4	49.0	3351.0	49.1	3370.7	49.3	3390.4	49.4	28
29	3410.2	49.5	3430.0	49.7	3449.9	49.8	3469.9	50.0	3489.9	50.1	3510.0	50.2	3530.1	50.4	3550.2	50.5	3570.5	50.6	3590.8	50.8	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 21; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	9.7	3.9	9.9	7.9	10.0	11.9	10.1	16.0	10.3	20.1	10.4	24.3	10.6	28.6	10.7	32.9	10.8	37.2	11.0	0
1	41.7	11.1	46.1	11.2	50.7	11.4	55.2	11.5	59.9	11.7	64.6	11.8	69.3	11.9	74.1	12.1	79.0	12.2	83.9	12.4	1
2	88.9	12.5	93.9	12.6	99.0	12.8	104.1	12.9	109.3	13.1	114.6	13.2	119.9	13.3	125.2	13.5	130.7	13.6	136.1	13.8	2
3	141.7	13.9	147.2	14.0	152.9	14.2	158.6	14.3	164.3	14.4	170.1	14.6	176.0	14.7	181.9	14.9	187.9	15.0	193.9	15.1	3
4	200.0	15.3	206.1	15.4	212.3	15.6	218.6	15.7	224.9	15.8	231.2	16.0	237.7	16.1	244.1	16.2	250.7	16.4	257.2	16.5	4
5	263.9	16.7	270.6	16.8	277.3	16.9	284.1	17.1	291.0	17.2	297.9	17.4	304.9	17.5	311.9	17.6	319.0	17.8	326.1	17.9	5
6	333.3	18.1	340.6	18.2	347.9	18.3	355.2	18.5	362.7	18.6	370.1	18.8	377.7	18.9	385.2	19.0	392.9	19.2	400.6	19.3	6
7	408.3	19.4	416.1	19.6	424.0	19.7	431.9	19.9	439.9	20.0	447.9	20.1	456.0	20.3	464.1	20.4	472.3	20.6	480.6	20.7	7
8	488.9	20.8	497.2	21.0	505.7	21.1	514.1	21.2	522.7	21.4	531.2	21.5	539.9	21.7	548.6	21.8	557.3	21.9	566.1	22.1	8
9	575.0	22.2	583.9	22.4	592.9	22.5	601.9	22.6	611.0	22.8	620.1	22.9	629.3	23.1	638.6	23.2	647.9	23.3	657.2	23.5	9
10	666.7	23.6	676.1	23.8	685.7	23.9	695.2	24.0	704.9	24.2	714.6	24.3	724.3	24.4	734.1	24.6	744.0	24.7	753.9	24.9	10
11	763.9	25.0	773.9	25.1	784.0	25.3	794.1	25.4	804.3	25.6	814.6	25.7	824.9	25.8	835.2	26.0	845.7	26.1	856.1	26.2	11
12	866.7	26.4	877.2	26.5	887.9	26.7	898.6	26.8	909.3	26.9	920.1	27.1	931.0	27.2	941.9	27.4	952.9	27.5	963.9	27.6	12
13	975.0	27.8	986.1	27.9	997.3	28.1	1008.6	28.2	1019.9	28.3	1031.2	28.5	1042.7	28.6	1054.1	28.8	1065.7	28.9	1077.2	29.0	13
14	1088.9	29.2	1100.6	29.3	1112.3	29.4	1124.1	29.6	1136.0	29.7	1147.9	29.9	1159.9	30.0	1171.9	30.1	1184.0	30.3	1196.1	30.4	14
15	1208.3	30.6	1220.6	30.7	1232.9	30.8	1245.2	31.0	1257.7	31.1	1270.1	31.2	1282.7	31.4	1295.2	31.5	1307.9	31.7	1320.6	31.8	15
16	1333.3	31.9	1346.1	32.1	1359.0	32.2	1371.9	32.4	1384.9	32.5	1397.9	32.6	1411.0	32.8	1424.1	32.9	1437.3	33.1	1450.6	33.2	16
17	1463.9	33.3	1477.2	33.5	1490.7	33.6	1504.1	33.8	1517.7	33.9	1531.2	34.0	1544.9	34.2	1558.6	34.3	1572.3	34.4	1586.1	34.6	17
18	1600.0	34.7	1613.9	34.9	1627.9	35.0	1641.9	35.1	1656.0	35.3	1670.1	35.4	1684.3	35.6	1698.6	35.7	1712.9	35.8	1727.2	36.0	18
19	1741.7	36.1	1756.1	36.2	1770.7	36.4	1785.2	36.5	1799.9	36.7	1814.6	36.8	1829.3	36.9	1844.1	37.1	1859.0	37.2	1873.9	37.4	19
20	1888.9	37.5	1903.9	37.6	1919.0	37.8	1934.1	37.9	1949.3	38.1	1964.6	38.2	1979.9	38.3	1995.2	38.5	2010.7	38.6	2026.1	38.8	20
21	2041.7	38.9	2057.2	39.0	2072.9	39.2	2088.6	39.3	2104.3	39.4	2120.1	39.6	2136.0	39.7	2151.9	39.9	2167.9	40.0	2183.9	40.1	21
22	2200.0	40.3	2216.1	40.4	2232.3	40.6	2248.6	40.7	2264.9	40.8	2281.2	41.0	2297.7	41.1	2314.1	41.2	2330.7	41.4	2347.2	41.5	22
23	2363.9	41.7	2380.6	41.8	2397.3	41.9	2414.1	42.1	2431.0	42.2	2447.9	42.4	2464.9	42.5	2481.9	42.6	2499.0	42.8	2516.1	42.9	23
24	2533.3	43.1	2550.6	43.2	2567.9	43.3	2585.2	43.5	2602.7	43.6	2620.1	43.8	2637.7	43.9	2655.2	44.0	2672.9	44.2	2690.6	44.3	24
25	2708.3	44.4	2726.1	44.6	2744.0	44.7	2761.9	44.9	2779.9	45.0	2797.9	45.1	2816.0	45.3	2834.1	45.4	2852.3	45.6	2870.6	45.7	25
26	2888.9	45.8	2907.2	46.0	2925.7	46.1	2944.1	46.2	2962.7	46.4	2981.2	46.5	2999.9	46.7	3018.6	46.8	3037.3	46.9	3056.1	47.1	26
27	3075.0	47.2	3093.9	47.4	3112.9	47.5	3131.9	47.6	3151.0	47.8	3170.1	47.9	3189.3	48.1	3208.6	48.2	3227.9	48.3	3247.2	48.5	27
28	3266.7	48.6	3286.1	48.8	3305.7	48.9	3325.2	49.0	3344.9	49.2	3364.6	49.3	3384.3	49.4	3404.1	49.6	3424.0	49.7	3443.9	49.9	28
29	3463.9	50.0	3483.9	50.1	3504.0	50.3	3524.1	50.4	3544.3	50.6	3564.6	50.7	3584.9	50.8	3605.2	51.0	3625.7	51.1	3646.1	51.2	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 22; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	10.2	4.1	10.3	8.3	10.5	12.5	10.6	16.7	10.7	21.1	10.9	25.4	11.0	29.9	11.2	34.4	11.3	38.9	11.4	0
1	43.5	11.6	48.2	11.7	52.9	11.9	57.7	12.0	62.5	12.1	67.4	12.3	72.3	12.4	77.3	12.5	82.3	12.7	87.4	12.8	1
2	92.6	13.0	97.8	13.1	103.1	13.2	108.4	13.4	113.8	13.5	119.2	13.7	124.7	13.8	130.2	13.9	135.9	14.1	141.5	14.2	2
3	147.2	14.4	153.0	14.5	158.8	14.6	164.7	14.8	170.6	14.9	176.6	15.0	182.7	15.2	188.8	15.3	194.9	15.5	201.1	15.6	3
4	207.4	15.7	213.7	15.9	220.1	16.0	226.5	16.2	233.0	16.3	239.6	16.4	246.2	16.6	252.8	16.7	259.6	16.9	266.3	17.0	4
5	273.1	17.1	280.0	17.3	287.0	17.4	294.0	17.5	301.0	17.7	308.1	17.8	315.3	18.0	322.5	18.1	329.7	18.2	337.1	18.4	5
6	344.4	18.5	351.9	18.7	359.4	18.8	366.9	18.9	374.5	19.1	382.2	19.2	389.9	19.4	397.7	19.5	405.5	19.6	413.4	19.8	6
7	421.3	19.9	429.3	20.0	437.3	20.2	445.4	20.3	453.6	20.5	461.8	20.6	470.1	20.7	478.4	20.9	486.8	21.0	495.2	21.2	7
8	503.7	21.3	512.2	21.4	520.9	21.6	529.5	21.7	538.2	21.9	547.0	22.0	555.8	22.1	564.7	22.3	573.6	22.4	582.6	22.5	8
9	591.7	22.7	600.8	22.8	609.9	23.0	619.1	23.1	628.4	23.2	637.7	23.4	647.1	23.5	656.5	23.7	666.0	23.8	675.6	23.9	9
10	685.2	24.1	694.8	24.2	704.6	24.4	714.3	24.5	724.1	24.6	734.0	24.8	744.0	24.9	754.0	25.0	764.0	25.2	774.1	25.3	10
11	784.3	25.5	794.5	25.6	804.7	25.7	815.1	25.9	825.4	26.0	835.9	26.2	846.4	26.3	856.9	26.4	867.5	26.6	878.2	26.7	11
12	888.9	26.9	899.7	27.0	910.5	27.1	921.4	27.3	932.3	27.4	943.3	27.5	954.3	27.7	965.4	27.8	976.6	28.0	987.8	28.1	12
13	999.1	28.2	1010.4	28.4	1021.8	28.5	1033.2	28.7	1044.7	28.8	1056.2	28.9	1067.9	29.1	1079.5	29.2	1091.2	29.4	1103.0	29.5	13
14	1114.8	29.6	1126.7	29.8	1138.6	29.9	1150.6	30.0	1162.7	30.2	1174.8	30.3	1186.9	30.5	1199.1	30.6	1211.4	30.7	1223.7	30.9	14
15	1236.1	31.0	1248.5	31.2	1261.0	31.3	1273.6	31.4	1286.2	31.6	1298.8	31.7	1311.6	31.9	1324.3	32.0	1337.1	32.1	1350.0	32.3	15
16	1363.0	32.4	1376.0	32.5	1389.0	32.7	1402.1	32.8	1415.3	33.0	1428.5	33.1	1441.7	33.2	1455.1	33.4	1468.4	33.5	1481.9	33.7	16
17	1495.4	33.8	1508.9	33.9	1522.5	34.1	1536.2	34.2	1549.9	34.4	1563.7	34.5	1577.5	34.6	1591.4	34.8	1605.3	34.9	1619.3	35.0	17
18	1633.3	35.2	1647.4	35.3	1661.6	35.5	1675.8	35.6	1690.1	35.7	1704.4	35.9	1718.8	36.0	1733.2	36.2	1747.7	36.3	1762.2	36.4	18
19	1776.9	36.6	1791.5	36.7	1806.2	36.9	1821.0	37.0	1835.8	37.1	1850.7	37.3	1865.6	37.4	1880.6	37.5	1895.7	37.7	1910.8	37.8	19
20	1925.9	38.0	1941.1	38.1	1956.4	38.2	1971.7	38.4	1987.1	38.5	2002.5	38.7	2018.0	38.8	2033.6	38.9	2049.2	39.1	2064.8	39.2	20
21	2080.6	39.4	2096.3	39.5	2112.1	39.6	2128.0	39.8	2144.0	39.9	2160.0	40.0	2176.0	40.2	2192.1	40.3	2208.3	40.5	2224.5	40.6	21
22	2240.7	40.7	2257.1	40.9	2273.4	41.0	2289.9	41.2	2306.4	41.3	2322.9	41.4	2339.5	41.6	2356.2	41.7	2372.9	41.9	2389.7	42.0	22
23	2406.5	42.1	2423.4	42.3	2440.3	42.4	2457.3	42.5	2474.3	42.7	2491.4	42.8	2508.6	43.0	2525.8	43.1	2543.1	43.2	2560.4	43.4	23
24	2577.8	43.5	2595.2	43.7	2612.7	43.8	2630.2	43.9	2647.9	44.1	2665.5	44.2	2683.2	44.4	2701.0	44.5	2718.8	44.6	2736.7	44.8	24
25	2754.6	44.9	2772.6	45.0	2790.7	45.2	2808.8	45.3	2826.9	45.5	2845.1	45.6	2863.4	45.7	2881.7	45.9	2900.1	46.0	2918.5	46.2	25
26	2937.0	46.3	2955.6	46.4	2974.2	46.6	2992.8	46.7	3011.6	46.9	3030.3	47.0	3049.1	47.1	3068.0	47.3	3087.0	47.4	3106.0	47.5	26
27	3125.0	47.7	3144.1	47.8	3163.3	48.0	3182.5	48.1	3201.7	48.2	3221.1	48.4	3240.4	48.5	3259.9	48.7	3279.4	48.8	3298.9	48.9	27
28	3318.5	49.1	3338.2	49.2	3357.9	49.4	3377.7	49.5	3397.5	49.6	3417.4	49.8	3437.3	49.9	3457.3	50.0	3477.3	50.2	3497.4	50.3	28
29	3517.6	50.5	3537.8	50.6	3558.1	50.7	3578.4	50.9	3598.8	51.0	3619.2	51.2	3639.7	51.3	3660.2	51.4	3680.9	51.6	3701.5	51.7	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 23; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	10.6	4.3	10.8	8.6	10.9	13.0	11.1	17.5	11.2	22.0	11.3	26.6	11.5	31.2	11.6	35.9	11.8	40.6	11.9	0
1	45.4	12.0	50.2	12.2	55.1	12.3	60.1	12.5	65.1	12.6	70.1	12.7	75.3	12.9	80.4	13.0	85.7	13.1	91.0	13.3	1
2	96.3	13.4	101.7	13.6	107.1	13.7	112.7	13.8	118.2	14.0	123.8	14.1	129.5	14.3	135.2	14.4	141.0	14.5	146.9	14.7	2
3	152.8	14.8	158.7	15.0	164.7	15.1	170.8	15.2	176.9	15.4	183.1	15.5	189.3	15.6	195.6	15.8	202.0	15.9	208.4	16.1	3
4	214.8	16.2	221.3	16.3	227.9	16.5	234.5	16.6	241.2	16.8	247.9	16.9	254.7	17.0	261.5	17.2	268.4	17.3	275.4	17.5	4
5	282.4	17.6	289.5	17.7	296.6	17.9	303.8	18.0	311.0	18.1	318.3	18.3	325.6	18.4	333.0	18.6	340.5	18.7	348.0	18.8	5
6	355.6	19.0	363.2	19.1	370.9	19.3	378.6	19.4	386.4	19.5	394.2	19.7	402.1	19.8	410.1	20.0	418.1	20.1	426.1	20.2	6
7	434.3	20.4	442.4	20.5	450.7	20.6	459.0	20.8	467.3	20.9	475.7	21.1	484.1	21.2	492.7	21.3	501.2	21.5	509.8	21.6	7
8	518.5	21.8	527.2	21.9	536.0	22.0	544.9	22.2	553.8	22.3	562.7	22.5	571.7	22.6	580.8	22.7	589.9	22.9	599.1	23.0	8
9	608.3	23.1	617.6	23.3	627.0	23.4	636.4	23.6	645.8	23.7	655.3	23.8	664.9	24.0	674.5	24.1	684.2	24.3	693.9	24.4	9
10	703.7	24.5	713.5	24.7	723.4	24.8	733.4	25.0	743.4	25.1	753.5	25.2	763.6	25.4	773.8	25.5	784.0	25.6	794.3	25.8	10
11	804.6	25.9	815.0	26.1	825.5	26.2	836.0	26.3	846.6	26.5	857.2	26.6	867.9	26.8	878.6	26.9	889.4	27.0	900.2	27.2	11
12	911.1	27.3	922.1	27.5	933.1	27.6	944.1	27.7	955.3	27.9	966.4	28.0	977.7	28.1	989.0	28.3	1000.3	28.4	1011.7	28.6	12
13	1023.1	28.7	1034.7	28.8	1046.2	29.0	1057.8	29.1	1069.5	29.3	1081.2	29.4	1093.0	29.5	1104.9	29.7	1116.8	29.8	1128.7	30.0	13
14	1140.7	30.1	1152.8	30.2	1164.9	30.4	1177.1	30.5	1189.3	30.6	1201.6	30.8	1214.0	30.9	1226.4	31.1	1238.8	31.2	1251.3	31.3	14
15	1263.9	31.5	1276.5	31.6	1289.2	31.8	1301.9	31.9	1314.7	32.0	1327.5	32.2	1340.4	32.3	1353.4	32.5	1366.4	32.6	1379.5	32.7	15
16	1392.6	32.9	1405.8	33.0	1419.0	33.1	1432.3	33.3	1445.6	33.4	1459.0	33.6	1472.5	33.7	1486.0	33.8	1499.6	34.0	1513.2	34.1	16
17	1526.9	34.3	1540.6	34.4	1554.4	34.5	1568.2	34.7	1582.1	34.8	1596.1	35.0	1610.1	35.1	1624.1	35.2	1638.3	35.4	1652.4	35.5	17
18	1666.7	35.6	1681.0	35.8	1695.3	35.9	1709.7	36.1	1724.1	36.2	1738.7	36.3	1753.2	36.5	1767.8	36.6	1782.5	36.8	1797.2	36.9	18
19	1812.0	37.0	1826.9	37.2	1841.8	37.3	1856.7	37.5	1871.7	37.6	1886.8	37.7	1901.9	37.9	1917.1	38.0	1932.3	38.1	1947.6	38.3	19
20	1963.0	38.4	1978.4	38.6	1993.8	38.7	2009.3	38.8	2024.9	39.0	2040.5	39.1	2056.2	39.3	2071.9	39.4	2087.7	39.5	2103.5	39.7	20
21	2119.4	39.8	2135.4	40.0	2151.4	40.1	2167.5	40.2	2183.6	40.4	2199.8	40.5	2216.0	40.6	2232.3	40.8	2248.6	40.9	2265.0	41.1	21
22	2281.5	41.2	2298.0	41.3	2314.6	41.5	2331.2	41.6	2347.9	41.8	2364.6	41.9	2381.4	42.0	2398.2	42.2	2415.1	42.3	2432.1	42.5	22
23	2449.1	42.6	2466.1	42.7	2483.3	42.9	2500.4	43.0	2517.7	43.1	2535.0	43.3	2552.3	43.4	2569.7	43.6	2587.1	43.7	2604.7	43.8	23
24	2622.2	44.0	2639.8	44.1	2657.5	44.3	2675.2	44.4	2693.0	44.5	2710.9	44.7	2728.8	44.8	2746.7	45.0	2764.7	45.1	2782.8	45.2	24
25	2800.9	45.4	2819.1	45.5	2837.3	45.6	2855.6	45.8	2874.0	45.9	2892.4	46.1	2910.8	46.2	2929.3	46.3	2947.9	46.5	2966.5	46.6	25
26	2985.2	46.8	3003.9	46.9	3022.7	47.0	3041.5	47.2	3060.4	47.3	3079.4	47.5	3098.4	47.6	3117.5	47.7	3136.6	47.9	3155.8	48.0	26
27	3175.0	48.1	3194.3	48.3	3213.6	48.4	3233.0	48.6	3252.5	48.7	3272.0	48.8	3291.6	49.0	3311.2	49.1	3330.9	49.3	3350.6	49.4	27
28	3370.4	49.5	3390.2	49.7	3410.1	49.8	3430.1	50.0	3450.1	50.1	3470.1	50.2	3490.3	50.4	3510.4	50.5	3530.7	50.6	3551.0	50.8	28
29	3571.3	50.9	3591.7	51.1	3612.1	51.2	3632.7	51.3	3653.2	51.5	3673.8	51.6	3694.5	51.8	3715.2	51.9	3736.0	52.0	3756.9	52.2	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 24; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	11.1	4.5	11.2	9.0	11.4	13.6	11.5	18.2	11.7	22.9	11.8	27.7	11.9	32.5	12.1	37.3	12.2	42.2	12.4	0
1	47.2	12.5	52.2	12.6	57.3	12.8	62.5	12.9	67.7	13.1	72.9	13.2	78.2	13.3	83.6	13.5	89.0	13.6	94.5	13.8	1
2	100.0	13.9	105.6	14.0	111.2	14.2	116.9	14.3	122.7	14.4	128.5	14.6	134.3	14.7	140.2	14.9	146.2	15.0	152.2	15.1	2
3	158.3	15.3	164.5	15.4	170.7	15.6	176.9	15.7	183.2	15.8	189.6	16.0	196.0	16.1	202.5	16.2	209.0	16.4	215.6	16.5	3
4	222.2	16.7	228.9	16.8	235.7	16.9	242.5	17.1	249.3	17.2	256.2	17.4	263.2	17.5	270.2	17.6	277.3	17.8	284.5	17.9	4
5	291.7	18.1	298.9	18.2	306.2	18.3	313.6	18.5	321.0	18.6	328.5	18.8	336.0	18.9	343.6	19.0	351.2	19.2	358.9	19.3	5
6	366.7	19.4	374.5	19.6	382.3	19.7	390.2	19.9	398.2	20.0	406.2	20.1	414.3	20.3	422.5	20.4	430.7	20.6	438.9	20.7	6
7	447.2	20.8	455.6	21.0	464.0	21.1	472.5	21.2	481.0	21.4	489.6	21.5	498.2	21.7	506.9	21.8	515.7	21.9	524.5	22.1	7
8	533.3	22.2	542.2	22.4	551.2	22.5	560.2	22.6	569.3	22.8	578.5	22.9	587.7	23.1	596.9	23.2	606.2	23.3	615.6	23.5	8
9	625.0	23.6	634.5	23.8	644.0	23.9	653.6	24.0	663.2	24.2	672.9	24.3	682.7	24.4	692.5	24.6	702.3	24.7	712.2	24.9	9
10	722.2	25.0	732.2	25.1	742.3	25.3	752.5	25.4	762.7	25.6	772.9	25.7	783.2	25.8	793.6	26.0	804.0	26.1	814.5	26.2	10
11	825.0	26.4	835.6	26.5	846.2	26.7	856.9	26.8	867.7	26.9	878.5	27.1	889.3	27.2	900.2	27.4	911.2	27.5	922.2	27.6	11
12	933.3	27.8	944.5	27.9	955.7	28.1	966.9	28.2	978.2	28.3	989.6	28.5	1001.0	28.6	1012.5	28.8	1024.0	28.9	1035.6	29.0	12
13	1047.2	29.2	1058.9	29.3	1070.7	29.4	1082.5	29.6	1094.3	29.7	1106.2	29.9	1118.2	30.0	1130.2	30.1	1142.3	30.3	1154.5	30.4	13
14	1166.7	30.6	1178.9	30.7	1191.2	30.8	1203.6	31.0	1216.0	31.1	1228.5	31.2	1241.0	31.4	1253.6	31.5	1266.2	31.7	1278.9	31.8	14
15	1291.7	31.9	1304.5	32.1	1317.3	32.2	1330.2	32.4	1343.2	32.5	1356.2	32.6	1369.3	32.8	1382.5	32.9	1395.7	33.1	1408.9	33.2	15
16	1422.2	33.3	1435.6	33.5	1449.0	33.6	1462.5	33.8	1476.0	33.9	1489.6	34.0	1503.2	34.2	1516.9	34.3	1530.7	34.4	1544.5	34.6	16
17	1558.3	34.7	1572.2	34.9	1586.2	35.0	1600.2	35.1	1614.3	35.3	1628.5	35.4	1642.7	35.6	1656.9	35.7	1671.2	35.8	1685.6	36.0	17
18	1700.0	36.1	1714.5	36.2	1729.0	36.4	1743.6	36.5	1758.2	36.7	1772.9	36.8	1787.7	36.9	1802.5	37.1	1817.3	37.2	1832.2	37.4	18
19	1847.2	37.5	1862.2	37.6	1877.3	37.8	1892.5	37.9	1907.7	38.1	1922.9	38.2	1938.2	38.3	1953.6	38.5	1969.0	38.6	1984.5	38.8	19
20	2000.0	38.9	2015.6	39.0	2031.2	39.2	2046.9	39.3	2062.7	39.4	2078.5	39.6	2094.3	39.7	2110.2	39.9	2126.2	40.0	2142.2	40.1	20
21	2158.3	40.3	2174.5	40.4	2190.7	40.6	2206.9	40.7	2223.2	40.8	2239.6	41.0	2256.0	41.1	2272.5	41.2	2289.0	41.4	2305.6	41.5	21
22	2322.2	41.7	2338.9	41.8	2355.7	41.9	2372.5	42.1	2389.3	42.2	2406.2	42.4	2423.2	42.5	2440.2	42.6	2457.3	42.8	2474.5	42.9	22
23	2491.7	43.1	2508.9	43.2	2526.2	43.3	2543.6	43.5	2561.0	43.6	2578.5	43.8	2596.0	43.9	2613.6	44.0	2631.2	44.2	2648.9	44.3	23
24	2666.7	44.4	2684.5	44.6	2702.3	44.7	2720.2	44.9	2738.2	45.0	2756.2	45.1	2774.3	45.3	2792.5	45.4	2810.7	45.6	2828.9	45.7	24
25	2847.2	45.8	2865.6	46.0	2884.0	46.1	2902.5	46.2	2921.0	46.4	2939.6	46.5	2958.2	46.7	2976.9	46.8	2995.7	46.9	3014.5	47.1	25
26	3033.3	47.2	3052.2	47.4	3071.2	47.5	3090.2	47.6	3109.3	47.8	3128.5	47.9	3147.7	48.1	3166.9	48.2	3186.2	48.3	3205.6	48.5	26
27	3225.0	48.6	3244.5	48.8	3264.0	48.9	3283.6	49.0	3303.2	49.2	3322.9	49.3	3342.7	49.4	3362.5	49.6	3382.3	49.7	3402.2	49.9	27
28	3422.2	50.0	3442.2	50.1	3462.3	50.3	3482.5	50.4	3502.7	50.6	3522.9	50.7	3543.2	50.8	3563.6	51.0	3584.0	51.1	3604.5	51.2	28
29	3625.0	51.4	3645.6	51.5	3666.2	51.7	3686.9	51.8	3707.7	51.9	3728.5	52.1	3749.3	52.2	3770.2	52.4	3791.2	52.5	3812.2	52.6	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 25; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	11.6	4.7	11.7	9.4	11.9	14.1	12.0	19.0	12.1	23.8	12.3	28.8	12.4	33.8	12.5	38.8	12.7	43.9	12.8	0
1	49.1	13.0	54.3	13.1	59.6	13.2	64.9	13.4	70.3	13.5	75.7	13.7	81.2	13.8	86.7	13.9	92.3	14.1	98.0	14.2	1
2	103.7	14.4	109.5	14.5	115.3	14.6	121.2	14.8	127.1	14.9	133.1	15.0	139.1	15.2	145.2	15.3	151.4	15.5	157.6	15.6	2
3	163.9	15.7	170.2	15.9	176.6	16.0	183.0	16.2	189.5	16.3	196.1	16.4	202.7	16.6	209.3	16.7	216.0	16.9	222.8	17.0	3
4	229.6	17.1	236.5	17.3	243.4	17.4	250.4	17.5	257.5	17.7	264.6	17.8	271.7	18.0	279.0	18.1	286.2	18.2	293.5	18.4	4
5	300.9	18.5	308.4	18.7	315.9	18.8	323.4	18.9	331.0	19.1	338.7	19.2	346.4	19.4	354.1	19.5	362.0	19.6	369.8	19.8	5
6	377.8	19.9	385.8	20.0	393.8	20.2	401.9	20.3	410.1	20.5	418.3	20.6	426.6	20.7	434.9	20.9	443.3	21.0	451.7	21.2	6
7	460.2	21.3	468.7	21.4	477.3	21.6	486.0	21.7	494.7	21.9	503.5	22.0	512.3	22.1	521.2	22.3	530.1	22.4	539.1	22.5	7
8	548.1	22.7	557.2	22.8	566.4	23.0	575.6	23.1	584.9	23.2	594.2	23.4	603.6	23.5	613.0	23.7	622.5	23.8	632.1	23.9	8
9	641.7	24.1	651.3	24.2	661.0	24.4	670.8	24.5	680.6	24.6	690.5	24.8	700.4	24.9	710.4	25.0	720.5	25.2	730.6	25.3	9
10	740.7	25.5	751.0	25.6	761.2	25.7	771.5	25.9	781.9	26.0	792.4	26.2	802.9	26.3	813.4	26.4	824.0	26.6	834.7	26.7	10
11	845.4	26.9	856.1	27.0	867.0	27.1	877.8	27.3	888.8	27.4	899.8	27.5	910.8	27.7	921.9	27.8	933.1	28.0	944.3	28.1	11
12	955.6	28.2	966.9	28.4	978.3	28.5	989.7	28.7	1001.2	28.8	1012.7	28.9	1024.3	29.1	1036.0	29.2	1047.7	29.4	1059.5	29.5	12
13	1071.3	29.6	1083.2	29.8	1095.1	29.9	1107.1	30.0	1119.1	30.2	1131.2	30.3	1143.4	30.5	1155.6	30.6	1167.9	30.7	1180.2	30.9	13
14	1192.6	31.0	1205.0	31.2	1217.5	31.3	1230.1	31.4	1242.7	31.6	1255.3	31.7	1268.0	31.9	1280.8	32.0	1293.6	32.1	1306.5	32.3	14
15	1319.4	32.4	1332.4	32.5	1345.5	32.7	1358.6	32.8	1371.7	33.0	1385.0	33.1	1398.2	33.2	1411.5	33.4	1424.9	33.5	1438.4	33.7	15
16	1451.9	33.8	1465.4	33.9	1479.0	34.1	1492.7	34.2	1506.4	34.4	1520.1	34.5	1534.0	34.6	1547.8	34.8	1561.8	34.9	1575.8	35.0	16
17	1589.8	35.2	1603.9	35.3	1618.1	35.5	1632.3	35.6	1646.6	35.7	1660.9	35.9	1675.3	36.0	1689.7	36.2	1704.2	36.3	1718.7	36.4	17
18	1733.3	36.6	1748.0	36.7	1762.7	36.9	1777.5	37.0	1792.3	37.1	1807.2	37.3	1822.1	37.4	1837.1	37.5	1852.1	37.7	1867.2	37.8	18
19	1882.4	38.0	1897.6	38.1	1912.9	38.2	1928.2	38.4	1943.6	38.5	1959.0	38.7	1974.5	38.8	1990.1	38.9	2005.7	39.1	2021.3	39.2	19
20	2037.0	39.4	2052.8	39.5	2068.6	39.6	2084.5	39.8	2100.4	39.9	2116.4	40.0	2132.5	40.2	2148.6	40.3	2164.7	40.5	2181.0	40.6	20
21	2197.2	40.7	2213.5	40.9	2229.9	41.0	2246.4	41.2	2262.9	41.3	2279.4	41.4	2296.0	41.6	2312.7	41.7	2329.4	41.9	2346.1	42.0	21
22	2363.0	42.1	2379.8	42.3	2396.8	42.4	2413.8	42.5	2430.8	42.7	2447.9	42.8	2465.1	43.0	2482.3	43.1	2499.6	43.2	2516.9	43.4	22
23	2534.3	43.5	2551.7	43.7	2569.2	43.8	2586.7	43.9	2604.3	44.1	2622.0	44.2	2639.7	44.4	2657.5	44.5	2675.3	44.6	2693.2	44.8	23
24	2711.1	44.9	2729.1	45.0	2747.1	45.2	2765.2	45.3	2783.4	45.5	2801.6	45.6	2819.9	45.7	2838.2	45.9	2856.6	46.0	2875.0	46.2	24
25	2893.5	46.3	2912.1	46.4	2930.7	46.6	2949.3	46.7	2968.0	46.9	2986.8	47.0	3005.6	47.1	3024.5	47.3	3043.4	47.4	3062.4	47.5	25
26	3081.5	47.7	3100.6	47.8	3119.7	48.0	3139.0	48.1	3158.2	48.2	3177.5	48.4	3196.9	48.5	3216.4	48.7	3235.9	48.8	3255.4	48.9	26
27	3275.0	49.1	3294.7	49.2	3314.4	49.4	3334.1	49.5	3354.0	49.6	3373.8	49.8	3393.8	49.9	3413.8	50.0	3433.8	50.2	3453.9	50.3	27
28	3474.1	50.5	3494.3	50.6	3514.6	50.7	3534.9	50.9	3555.3	51.0	3575.7	51.2	3596.2	51.3	3616.7	51.4	3637.3	51.6	3658.0	51.7	28
29	3678.7	51.9	3699.5	52.0	3720.3	52.1	3741.2	52.3	3762.1	52.4	3783.1	52.5	3804.1	52.7	3825.2	52.8	3846.4	53.0	3867.6	53.1	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 26; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	12.0	4.8	12.2	9.7	12.3	14.7	12.5	19.7	12.6	24.8	12.7	29.9	12.9	35.1	13.0	40.3	13.1	45.6	13.3	0
1	50.9	13.4	56.3	13.6	61.8	13.7	67.3	13.8	72.9	14.0	78.5	14.1	84.1	14.3	89.9	14.4	95.7	14.5	101.5	14.7	1
2	107.4	14.8	113.4	15.0	119.4	15.1	125.4	15.2	131.6	15.4	137.7	15.5	144.0	15.6	150.2	15.8	156.6	15.9	163.0	16.1	2
3	169.4	16.2	176.0	16.3	182.5	16.5	189.1	16.6	195.8	16.8	202.5	16.9	209.3	17.0	216.2	17.2	223.1	17.3	230.0	17.5	3
4	237.0	17.6	244.1	17.7	251.2	17.9	258.4	18.0	265.6	18.1	272.9	18.3	280.3	18.4	287.7	18.6	295.1	18.7	302.6	18.8	4
5	310.2	19.0	317.8	19.1	325.5	19.3	333.2	19.4	341.0	19.5	348.8	19.7	356.7	19.8	364.7	20.0	372.7	20.1	380.8	20.2	5
6	388.9	20.4	397.1	20.5	405.3	20.6	413.6	20.8	421.9	20.9	430.3	21.1	438.8	21.2	447.3	21.3	455.9	21.5	464.5	21.6	6
7	473.1	21.8	481.9	21.9	490.7	22.0	499.5	22.2	508.4	22.3	517.4	22.5	526.4	22.6	535.4	22.7	544.6	22.9	553.7	23.0	7
8	563.0	23.1	572.2	23.3	581.6	23.4	591.0	23.6	600.4	23.7	610.0	23.8	619.5	24.0	629.1	24.1	638.8	24.3	648.5	24.4	8
9	658.3	24.5	668.2	24.7	678.1	24.8	688.0	25.0	698.0	25.1	708.1	25.2	718.2	25.4	728.4	25.5	738.6	25.6	748.9	25.8	9
10	759.3	25.9	769.7	26.1	780.1	26.2	790.6	26.3	801.2	26.5	811.8	26.6	822.5	26.8	833.2	26.9	844.0	27.0	854.8	27.2	10
11	865.7	27.3	876.7	27.5	887.7	27.6	898.8	27.7	909.9	27.9	921.1	28.0	932.3	28.1	943.6	28.3	954.9	28.4	966.3	28.6	11
12	977.8	28.7	989.3	28.8	1000.9	29.0	1012.5	29.1	1024.1	29.3	1035.9	29.4	1047.7	29.5	1059.5	29.7	1071.4	29.8	1083.4	30.0	12
13	1095.4	30.1	1107.4	30.2	1119.6	30.4	1131.7	30.5	1144.0	30.6	1156.2	30.8	1168.6	30.9	1181.0	31.1	1193.4	31.2	1206.0	31.3	13
14	1218.5	31.5	1231.1	31.6	1243.8	31.8	1256.5	31.9	1269.3	32.0	1282.2	32.2	1295.1	32.3	1308.0	32.5	1321.0	32.6	1334.1	32.7	14
15	1347.2	32.9	1360.4	33.0	1373.6	33.1	1386.9	33.3	1400.3	33.4	1413.7	33.6	1427.1	33.7	1440.6	33.8	1454.2	34.0	1467.8	34.1	15
16	1481.5	34.3	1495.2	34.4	1509.0	34.5	1522.8	34.7	1536.7	34.8	1550.7	35.0	1564.7	35.1	1578.8	35.2	1592.9	35.4	1607.1	35.5	16
17	1621.3	35.6	1635.6	35.8	1649.9	35.9	1664.3	36.1	1678.8	36.2	1693.3	36.3	1707.9	36.5	1722.5	36.6	1737.1	36.8	1751.9	36.9	17
18	1766.7	37.0	1781.5	37.2	1796.4	37.3	1811.4	37.5	1826.4	37.6	1841.4	37.7	1856.6	37.9	1871.7	38.0	1887.0	38.1	1902.2	38.3	18
19	1917.6	38.4	1933.0	38.6	1948.4	38.7	1964.0	38.8	1979.5	39.0	1995.1	39.1	2010.8	39.3	2026.5	39.4	2042.3	39.5	2058.2	39.7	19
20	2074.1	39.8	2090.0	40.0	2106.0	40.1	2122.1	40.2	2138.2	40.4	2154.4	40.5	2170.6	40.6	2186.9	40.8	2203.3	40.9	2219.7	41.1	20
21	2236.1	41.2	2252.6	41.3	2269.2	41.5	2285.8	41.6	2302.5	41.8	2319.2	41.9	2336.0	42.0	2352.8	42.2	2369.7	42.3	2386.7	42.5	21
22	2403.7	42.6	2420.8	42.7	2437.9	42.9	2455.1	43.0	2472.3	43.1	2489.6	43.3	2506.9	43.4	2524.3	43.6	2541.8	43.7	2559.3	43.8	22
23	2576.9	44.0	2594.5	44.1	2612.1	44.3	2629.9	44.4	2647.7	44.5	2665.5	44.7	2683.4	44.8	2701.4	45.0	2719.4	45.1	2737.4	45.2	23
24	2755.6	45.4	2773.7	45.5	2792.0	45.6	2810.2	45.8	2828.6	45.9	2847.0	46.1	2865.4	46.2	2884.0	46.3	2902.5	46.5	2921.1	46.6	24
25	2939.8	46.8	2958.5	46.9	2977.3	47.0	2996.2	47.2	3015.1	47.3	3034.0	47.5	3053.0	47.6	3072.1	47.7	3091.2	47.9	3110.4	48.0	25
26	3129.6	48.1	3148.9	48.3	3168.3	48.4	3187.7	48.6	3207.1	48.7	3226.6	48.8	3246.2	49.0	3265.8	49.1	3285.5	49.3	3305.2	49.4	26
27	3325.0	49.5	3344.8	49.7	3364.7	49.8	3384.7	50.0	3404.7	50.1	3424.8	50.2	3444.9	50.4	3465.1	50.5	3485.3	50.6	3505.6	50.8	27
28	3525.9	50.9	3546.3	51.1	3566.8	51.2	3587.3	51.3	3607.9	51.5	3628.5	51.6	3649.1	51.8	3669.9	51.9	3690.7	52.0	3711.5	52.2	28
29	3732.4	52.3	3753.4	52.5	3774.4	52.6	3795.4	52.7	3816.6	52.9	3837.7	53.0	3859.0	53.1	3880.2	53.3	3901.6	53.4	3923.0	53.6	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 27; SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	12.5	5.0	12.6	10.1	12.8	15.2	12.9	20.4	13.1	25.7	13.2	31.0	13.3	36.4	13.5	41.8	13.6	47.2	13.8	0
1	52.8	13.9	58.4	14.0	64.0	14.2	69.7	14.3	75.4	14.4	81.2	14.6	87.1	14.7	93.0	14.9	99.0	15.0	105.0	15.1	1
2	111.1	15.3	117.2	15.4	123.4	15.6	129.7	15.7	136.0	15.8	142.4	16.0	148.8	16.1	155.2	16.2	161.8	16.4	168.4	16.5	2
3	175.0	16.7	181.7	16.8	188.4	16.9	195.2	17.1	202.1	17.2	209.0	17.4	216.0	17.5	223.0	17.6	230.1	17.8	237.2	17.9	3
4	244.4	18.1	251.7	18.2	259.0	18.3	266.4	18.5	273.8	18.6	281.2	18.8	288.8	18.9	296.4	19.0	304.0	19.2	311.7	19.3	4
5	319.4	19.4	327.2	19.6	335.1	19.7	343.0	19.9	351.0	20.0	359.0	20.1	367.1	20.3	375.2	20.4	383.4	20.6	391.7	20.7	5
6	400.0	20.8	408.4	21.0	416.8	21.1	425.2	21.2	433.8	21.4	442.4	21.5	451.0	21.7	459.7	21.8	468.4	21.9	477.2	22.1	6
7	486.1	22.2	495.0	22.4	504.0	22.5	513.0	22.6	522.1	22.8	531.2	22.9	540.4	23.1	549.7	23.2	559.0	23.3	568.4	23.5	7
8	577.8	23.6	587.2	23.8	596.8	23.9	606.4	24.0	616.0	24.2	625.7	24.3	635.4	24.4	645.2	24.6	655.1	24.7	665.0	24.9	8
9	675.0	25.0	685.0	25.1	695.1	25.3	705.2	25.4	715.4	25.6	725.7	25.7	736.0	25.8	746.4	26.0	756.8	26.1	767.2	26.2	9
10	777.8	26.4	788.4	26.5	799.0	26.7	809.7	26.8	820.4	26.9	831.2	27.1	842.1	27.2	853.0	27.4	864.0	27.5	875.0	27.6	10
11	886.1	27.8	897.2	27.9	908.4	28.1	919.7	28.2	931.0	28.3	942.4	28.5	953.8	28.6	965.2	28.8	976.8	28.9	988.4	29.0	11
12	1000.0	29.2	1011.7	29.3	1023.4	29.4	1035.2	29.6	1047.1	29.7	1059.0	29.9	1071.0	30.0	1083.0	30.1	1095.1	30.3	1107.2	30.4	12
13	1119.4	30.6	1131.7	30.7	1144.0	30.8	1156.4	31.0	1168.8	31.1	1181.2	31.2	1193.8	31.4	1206.4	31.5	1219.0	31.7	1231.7	31.8	13
14	1244.4	31.9	1257.2	32.1	1270.1	32.2	1283.0	32.4	1296.0	32.5	1309.0	32.6	1322.1	32.8	1335.2	32.9	1348.4	33.1	1361.7	33.2	14
15	1375.0	33.3	1388.4	33.5	1401.8	33.6	1415.2	33.8	1428.8	33.9	1442.4	34.0	1456.0	34.2	1469.7	34.3	1483.4	34.4	1497.2	34.6	15
16	1511.1	34.7	1525.0	34.9	1539.0	35.0	1553.0	35.1	1567.1	35.3	1581.2	35.4	1595.4	35.6	1609.7	35.7	1624.0	35.8	1638.4	36.0	16
17	1652.8	36.1	1667.2	36.2	1681.8	36.4	1696.4	36.5	1711.0	36.7	1725.7	36.8	1740.4	36.9	1755.2	37.1	1770.1	37.2	1785.0	37.4	17
18	1800.0	37.5	1815.0	37.6	1830.1	37.8	1845.2	37.9	1860.4	38.1	1875.7	38.2	1891.0	38.3	1906.4	38.5	1921.8	38.6	1937.2	38.8	18
19	1952.8	38.9	1968.4	39.0	1984.0	39.2	1999.7	39.3	2015.4	39.4	2031.2	39.6	2047.1	39.7	2063.0	39.9	2079.0	40.0	2095.0	40.1	19
20	2111.1	40.3	2127.2	40.4	2143.4	40.6	2159.7	40.7	2176.0	40.8	2192.4	41.0	2208.8	41.1	2225.2	41.2	2241.8	41.4	2258.4	41.5	20
21	2275.0	41.7	2291.7	41.8	2308.4	41.9	2325.2	42.1	2342.1	42.2	2359.0	42.4	2376.0	42.5	2393.0	42.6	2410.1	42.8	2427.2	42.9	21
22	2444.4	43.1	2461.7	43.2	2479.0	43.3	2496.4	43.5	2513.8	43.6	2531.2	43.8	2548.8	43.9	2566.4	44.0	2584.0	44.2	2601.7	44.3	22
23	2619.4	44.4	2637.2	44.6	2655.1	44.7	2673.0	44.9	2691.0	45.0	2709.0	45.1	2727.1	45.3	2745.2	45.4	2763.4	45.6	2781.7	45.7	23
24	2800.0	45.8	2818.4	46.0	2836.8	46.1	2855.2	46.2	2873.8	46.4	2892.4	46.5	2911.0	46.7	2929.7	46.8	2948.4	46.9	2967.2	47.1	24
25	2986.1	47.2	3005.0	47.4	3024.0	47.5	3043.0	47.6	3062.1	47.8	3081.2	47.9	3100.4	48.1	3119.7	48.2	3139.0	48.3	3158.4	48.5	25
26	3177.8	48.6	3197.2	48.8	3216.8	48.9	3236.4	49.0	3256.0	49.2	3275.7	49.3	3295.4	49.4	3315.2	49.6	3335.1	49.7	3355.0	49.9	26
27	3375.0	50.0	3395.0	50.1	3415.1	50.3	3435.2	50.4	3455.4	50.6	3475.7	50.7	3496.0	50.8	3516.4	51.0	3536.8	51.1	3557.2	51.2	27
28	3577.8	51.4	3598.4	51.5	3619.0	51.7	3639.7	51.8	3660.4	51.9	3681.2	52.1	3702.1	52.2	3723.0	52.4	3744.0	52.5	3765.0	52.6	28
29	3786.1	52.8	3807.2	52.9	3828.4	53.1	3849.7	53.2	3871.0	53.3	3892.4	53.5	3913.8	53.6	3935.2	53.8	3956.8	53.9	3978.4	54.0	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 28: SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	13.0	5.2	13.1	10.5	13.2	15.8	13.4	21.2	13.5	26.6	13.7	32.1	13.8	37.7	13.9	43.3	14.1	48.9	14.2	0
1	54.6	14.4	60.4	14.5	66.2	14.6	72.1	14.8	78.0	14.9	84.0	15.0	90.1	15.2	96.2	15.3	102.3	15.5	108.5	15.6	1
2	114.8	15.7	121.1	15.9	127.5	16.0	134.0	16.2	140.4	16.3	147.0	16.4	153.6	16.6	160.2	16.7	167.0	16.9	173.7	17.0	2
3	180.6	17.1	187.4	17.3	194.4	17.4	201.4	17.5	208.4	17.7	215.5	17.8	222.7	18.0	229.9	18.1	237.1	18.2	244.5	18.4	3
4	251.9	18.5	259.3	18.7	266.8	18.8	274.3	18.9	281.9	19.1	289.6	19.2	297.3	19.4	305.1	19.5	312.9	19.6	320.8	19.8	4
5	328.7	19.9	336.7	20.0	344.7	20.2	352.8	20.3	361.0	20.5	369.2	20.6	377.5	20.7	385.8	20.9	394.2	21.0	402.6	21.2	5
6	411.1	21.3	419.7	21.4	428.3	21.6	436.9	21.7	445.6	21.9	454.4	22.0	463.2	22.1	472.1	22.3	481.0	22.4	490.0	22.5	6
7	499.1	22.7	508.2	22.8	517.3	23.0	526.5	23.1	535.8	23.2	545.1	23.4	554.5	23.5	564.0	23.7	573.4	23.8	583.0	23.9	7
8	592.6	24.1	602.2	24.2	612.0	24.4	621.7	24.5	631.6	24.6	641.4	24.8	651.4	24.9	661.4	25.0	671.4	25.2	681.5	25.3	8
9	691.7	25.5	701.9	25.6	712.1	25.7	722.5	25.9	732.9	26.0	743.3	26.2	753.8	26.3	764.3	26.4	774.9	26.6	785.6	26.7	9
10	796.3	26.9	807.1	27.0	817.9	27.1	828.8	27.3	839.7	27.4	850.7	27.5	861.7	27.7	872.8	27.8	884.0	28.0	895.2	28.1	10
11	906.5	28.2	917.8	28.4	929.2	28.5	940.6	28.7	952.1	28.8	963.7	28.9	975.3	29.1	986.9	29.2	998.6	29.4	1010.4	29.5	11
12	1022.2	29.6	1034.1	29.8	1046.0	29.9	1058.0	30.0	1070.1	30.2	1082.2	30.3	1094.3	30.5	1106.5	30.6	1118.8	30.7	1131.1	30.9	12
13	1143.5	31.0	1156.0	31.2	1168.4	31.3	1181.0	31.4	1193.6	31.6	1206.2	31.7	1219.0	31.9	1231.7	32.0	1244.6	32.1	1257.4	32.3	13
14	1270.4	32.4	1283.4	32.5	1296.4	32.7	1309.5	32.8	1322.7	33.0	1335.9	33.1	1349.1	33.2	1362.5	33.4	1375.9	33.5	1389.3	33.7	14
15	1402.8	33.8	1416.3	33.9	1429.9	34.1	1443.6	34.2	1457.3	34.4	1471.1	34.5	1484.9	34.6	1498.8	34.8	1512.7	34.9	1526.7	35.0	15
16	1540.7	35.2	1554.8	35.3	1569.0	35.5	1583.2	35.6	1597.5	35.7	1611.8	35.9	1626.2	36.0	1640.6	36.2	1655.1	36.3	1669.7	36.4	16
17	1684.3	36.6	1698.9	36.7	1713.6	36.9	1728.4	37.0	1743.2	37.1	1758.1	37.3	1773.0	37.4	1788.0	37.5	1803.1	37.7	1818.2	37.8	17
18	1833.3	38.0	1848.5	38.1	1863.8	38.2	1879.1	38.4	1894.5	38.5	1910.0	38.7	1925.4	38.8	1941.0	38.9	1956.6	39.1	1972.2	39.2	18
19	1988.0	39.4	2003.7	39.5	2019.6	39.6	2035.4	39.8	2051.4	39.9	2067.4	40.0	2083.4	40.2	2099.5	40.3	2115.7	40.5	2131.9	40.6	19
20	2148.1	40.7	2164.5	40.9	2180.9	41.0	2197.3	41.2	2213.8	41.3	2230.3	41.4	2246.9	41.6	2263.6	41.7	2280.3	41.9	2297.1	42.0	20
21	2313.9	42.1	2330.8	42.3	2347.7	42.4	2364.7	42.5	2381.7	42.7	2398.8	42.8	2416.0	43.0	2433.2	43.1	2450.5	43.2	2467.8	43.4	21
22	2485.2	43.5	2502.6	43.7	2520.1	43.8	2537.7	43.9	2555.3	44.1	2572.9	44.2	2590.6	44.4	2608.4	44.5	2626.2	44.6	2644.1	44.8	22
23	2662.0	44.9	2680.0	45.0	2698.1	45.2	2716.2	45.3	2734.3	45.5	2752.5	45.6	2770.8	45.7	2789.1	45.9	2807.5	46.0	2826.0	46.2	23
24	2844.4	46.3	2863.0	46.4	2881.6	46.6	2900.2	46.7	2919.0	46.9	2937.7	47.0	2956.6	47.1	2975.4	47.3	2994.4	47.4	3013.4	47.5	24
25	3032.4	47.7	3051.5	47.8	3070.7	48.0	3089.9	48.1	3109.1	48.2	3128.5	48.4	3147.9	48.5	3167.3	48.7	3186.8	48.8	3206.3	48.9	25
26	3225.9	49.1	3245.6	49.2	3265.3	49.4	3285.1	49.5	3304.9	49.6	3324.8	49.8	3344.7	49.9	3364.7	50.0	3384.7	50.2	3404.8	50.3	26
27	3425.0	50.5	3445.2	50.6	3465.5	50.7	3485.8	50.9	3506.2	51.0	3526.6	51.2	3547.1	51.3	3567.7	51.4	3588.3	51.6	3608.9	51.7	27
28	3629.6	51.9	3650.4	52.0	3671.2	52.1	3692.1	52.3	3713.0	52.4	3734.0	52.5	3755.1	52.7	3776.2	52.8	3797.3	53.0	3818.5	53.1	28
29	3839.8	53.2	3861.1	53.4	3882.5	53.5	3904.0	53.7	3925.4	53.8	3947.0	53.9	3968.6	54.1	3990.2	54.2	4012.0	54.4	4033.7	54.5	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 29: SLOPE 1½ TO 1. CU. YDS. PER 50 FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	13.4	5.4	13.6	10.9	13.7	16.4	13.8	21.9	14.0	27.5	14.1	33.2	14.3	39.0	14.4	44.7	14.5	50.6	14.7	0
1	56.5	14.8	62.4	15.0	68.4	15.1	74.5	15.2	80.6	15.4	86.8	15.5	93.0	15.6	99.3	15.8	105.7	15.9	112.1	16.1	1
2	118.5	16.2	125.0	16.3	131.6	16.5	138.2	16.6	144.9	16.8	151.6	16.9	158.4	17.0	165.2	17.2	172.1	17.3	179.1	17.5	2
3	186.1	17.6	193.2	17.7	200.3	17.9	207.5	18.0	214.7	18.1	222.0	18.3	229.3	18.4	236.7	18.6	244.2	18.7	251.7	18.8	3
4	259.3	19.0	266.9	19.1	274.6	19.3	282.3	19.4	290.1	19.5	297.9	19.7	305.8	19.8	313.8	20.0	321.8	20.1	329.8	20.2	4
5	338.0	20.4	346.1	20.5	354.4	20.6	362.7	20.8	371.0	20.9	379.4	21.1	387.9	21.2	396.4	21.3	404.9	21.5	413.5	21.6	5
6	422.2	21.8	431.0	21.9	439.7	22.0	448.6	22.2	457.5	22.3	466.4	22.5	475.4	22.6	484.5	22.7	493.6	22.9	502.8	23.0	6
7	512.0	23.1	521.3	23.3	530.7	23.4	540.1	23.6	549.5	23.7	559.0	23.8	568.6	24.0	578.2	24.1	587.9	24.3	597.6	24.4	7
8	607.4	24.5	617.2	24.7	627.1	24.8	637.1	25.0	647.1	25.1	657.2	25.2	667.3	25.4	677.5	25.5	687.7	25.6	698.0	25.8	8
9	708.3	25.9	718.7	26.1	729.2	26.2	739.7	26.3	750.3	26.5	760.9	26.6	771.6	26.8	782.3	26.9	793.1	27.0	803.9	27.2	9
10	814.8	27.3	825.8	27.5	836.8	27.6	847.8	27.7	859.0	27.9	870.1	28.0	881.4	28.1	892.7	28.3	904.0	28.4	915.4	28.6	10
11	926.9	28.7	938.4	28.8	949.9	29.0	961.5	29.1	973.2	29.3	985.0	29.4	996.7	29.5	1008.6	29.7	1020.5	29.8	1032.4	30.0	11
12	1044.4	30.1	1056.5	30.2	1068.6	30.4	1080.8	30.5	1093.0	30.6	1105.3	30.8	1117.7	30.9	1130.1	31.1	1142.5	31.2	1155.0	31.3	12
13	1167.6	31.5	1180.2	31.6	1192.9	31.8	1205.6	31.9	1218.4	32.0	1231.2	32.2	1244.1	32.3	1257.1	32.5	1270.1	32.6	1283.2	32.7	13
14	1296.3	32.9	1309.5	33.0	1322.7	33.1	1336.0	33.3	1349.3	33.4	1362.7	33.6	1376.2	33.7	1389.7	33.8	1403.3	34.0	1416.9	34.1	14
15	1430.6	34.3	1444.3	34.4	1458.1	34.5	1471.9	34.7	1485.8	34.8	1499.8	35.0	1513.8	35.1	1527.8	35.2	1542.0	35.4	1556.1	35.5	15
16	1570.4	35.6	1584.7	35.8	1599.0	35.9	1613.4	36.1	1627.9	36.2	1642.4	36.3	1656.9	36.5	1671.5	36.6	1686.2	36.8	1701.0	36.9	16
17	1715.7	37.0	1730.6	37.2	1745.5	37.3	1760.4	37.5	1775.4	37.6	1790.5	37.7	1805.6	37.9	1820.8	38.0	1836.0	38.1	1851.3	38.3	17
18	1866.7	38.4	1882.1	38.6	1897.5	38.7	1913.0	38.8	1928.6	39.0	1944.2	39.1	1959.9	39.3	1975.6	39.4	1991.4	39.5	2007.2	39.7	18
19	2023.1	39.8	2039.1	40.0	2055.1	40.1	2071.2	40.2	2087.3	40.4	2103.5	40.5	2119.7	40.6	2136.0	40.8	2152.3	40.9	2168.7	41.1	19
20	2185.2	41.2	2201.7	41.3	2218.3	41.5	2234.9	41.6	2251.6	41.8	2268.3	41.9	2285.1	42.0	2301.9	42.2	2318.8	42.3	2335.8	42.5	20
21	2352.8	42.6	2369.8	42.7	2387.0	42.9	2404.1	43.0	2421.4	43.1	2438.7	43.3	2456.0	43.4	2473.4	43.6	2490.9	43.7	2508.4	43.8	21
22	2525.9	44.0	2543.5	44.1	2561.2	44.3	2579.0	44.4	2596.7	44.5	2614.6	44.7	2632.5	44.8	2650.4	45.0	2668.4	45.1	2686.5	45.2	22
23	2704.6	45.4	2722.8	45.5	2741.0	45.6	2759.8	45.8	2777.7	45.9	2796.1	46.1	2814.5	46.2	2833.0	46.3	2851.6	46.5	2870.2	46.6	23
24	2888.9	46.8	2907.6	46.9	2926.4	47.0	2945.2	47.2	2964.1	47.3	2983.1	47.5	3002.1	47.6	3021.2	47.7	3040.3	47.9	3059.5	48.0	24
25	3078.7	48.1	3098.0	48.3	3117.3	48.4	3136.7	48.6	3156.2	48.7	3175.7	48.8	3195.3	49.0	3214.9	49.1	3234.6	49.3	3254.3	49.4	25
26	3274.1	49.5	3293.9	49.7	3313.8	49.8	3333.8	50.0	3353.8	50.1	3373.8	50.2	3394.0	50.4	3414.1	50.5	3434.4	50.6	3454.7	50.8	26
27	3475.0	50.9	3495.4	51.1	3515.9	51.2	3536.4	51.3	3556.9	51.5	3577.5	51.6	3598.2	51.8	3619.0	51.9	3639.7	52.0	3660.6	52.2	27
28	3681.5	52.3	3702.4	52.5	3723.4	52.6	3744.5	52.7	3765.6	52.9	3786.8	53.0	3808.0	53.1	3829.3	53.3	3850.7	53.4	3872.1	53.6	28
29	3893.5	53.7	3915.0	53.8	3936.6	54.0	3958.2	54.1	3979.9	54.3	4001.6	54.4	4023.4	54.5	4045.2	54.7	4067.1	54.8	4089.1	55.0	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXII.—BASE 30: SLOPE 1½ TO 1. CU. YDS. [illegible] FT.

	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		
c	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	L.	K.	*c*
0	0.0	13.9	5.6	14.0	11.2	14.2	16.9	14.3	22.7	14.4	28.5	14.6	34.3	14.7	40.2	14.9	46.2	15.0	52.2	15.1	0
1	58.3	15.3	64.5	15.4	70.7	15.6	76.9	15.7	83.2	15.8	89.6	16.0	96.0	16.1	102.5	16.2	109.0	16.4	115.6	16.5	1
2	122.2	16.7	128.9	16.8	135.7	16.9	142.5	17.1	149.3	17.2	156.2	17.4	163.2	17.5	170.2	17.6	177.3	17.8	184.5	17.9	2
3	191.7	18.1	198.9	18.2	206.2	18.3	213.6	18.5	221.0	18.6	228.5	18.8	236.0	18.9	243.6	19.0	251.2	19.2	258.9	19.3	3
4	266.7	19.4	274.5	19.6	282.3	19.7	290.2	19.9	298.2	20.0	306.2	20.1	314.3	20.3	322.5	20.4	330.7	20.6	338.9	20.7	4
5	347.2	20.8	355.6	21.0	364.0	21.1	372.5	21.2	381.0	21.4	389.6	21.5	398.2	21.7	406.9	21.8	415.7	21.9	424.5	22.1	5
6	433.3	22.2	442.2	22.4	451.2	22.5	460.2	22.6	469.3	22.8	478.5	22.9	487.7	23.1	496.9	23.2	506.2	23.3	515.6	23.5	6
7	525.0	23.6	534.5	23.8	544.0	23.9	553.6	24.0	563.2	24.2	572.9	24.3	582.7	24.4	592.5	24.6	602.3	24.7	612.2	24.9	7
8	622.2	25.0	632.2	25.1	642.3	25.3	652.5	25.4	662.7	25.6	672.9	25.7	683.2	25.8	693.6	26.0	704.0	26.1	714.5	26.2	8
9	725.0	26.4	735.6	26.5	746.2	26.7	756.9	26.8	767.7	26.9	778.5	27.1	789.3	27.2	800.2	27.4	811.2	27.5	822.2	27.6	9
10	833.3	27.8	844.5	27.9	855.7	28.1	866.9	28.2	878.2	28.3	889.6	28.5	901.0	28.6	912.5	28.8	924.0	28.9	935.6	29.0	10
11	947.2	29.2	958.9	29.3	970.7	29.4	982.5	29.6	994.3	29.7	1006.2	29.9	1018.2	30.0	1030.2	30.1	1042.3	30.3	1054.5	30.4	11
12	1066.7	30.6	1078.9	30.7	1091.2	30.8	1103.6	31.0	1116.0	31.1	1128.5	31.2	1141.0	31.4	1153.6	31.5	1166.2	31.7	1178.9	31.8	12
13	1191.7	31.9	1204.5	32.1	1217.3	32.2	1230.2	32.4	1243.2	32.5	1256.2	32.6	1269.3	32.8	1282.5	32.9	1295.7	33.1	1308.9	33.2	13
14	1322.2	33.3	1335.6	33.5	1349.0	33.6	1362.5	33.8	1376.0	33.9	1389.6	34.0	1403.2	34.2	1416.9	34.3	1430.7	34.4	1444.5	34.6	14
15	1458.3	34.7	1472.2	34.9	1486.2	35.0	1500.2	35.1	1514.3	35.3	1528.5	35.4	1542.7	35.6	1556.9	35.7	1571.2	35.8	1585.6	36.0	15
16	1600.0	36.1	1614.5	36.2	1629.0	36.4	1643.6	36.5	1658.2	36.7	1672.9	36.8	1687.7	36.9	1702.5	37.1	1717.3	37.2	1732.2	37.4	16
17	1747.2	37.5	1762.2	37.6	1777.3	37.8	1792.5	37.9	1807.7	38.1	1822.9	38.2	1838.2	38.3	1853.6	38.5	1869.0	38.6	1884.5	38.8	17
18	1900.0	38.9	1915.6	39.0	1931.2	39.2	1946.9	39.3	1962.7	39.4	1978.5	39.6	1994.3	39.7	2010.2	39.9	2026.2	40.0	2042.2	40.1	18
19	2058.3	40.3	2074.5	40.4	2090.7	40.6	2106.9	40.7	2123.2	40.8	2139.6	41.0	2156.0	41.1	2172.5	41.2	2189.0	41.4	2205.6	41.5	19
20	2222.2	41.7	2238.9	41.8	2255.7	41.9	2272.5	42.1	2289.3	42.2	2306.2	42.4	2323.2	42.5	2340.2	42.6	2357.3	42.8	2374.5	42.9	20
21	2391.7	43.1	2408.9	43.2	2426.2	43.3	2443.6	43.5	2461.0	43.6	2478.5	43.8	2496.0	43.9	2513.6	44.0	2531.2	44.2	2548.9	44.3	21
22	2566.7	44.4	2584.5	44.6	2602.3	44.7	2620.2	44.9	2638.2	45.0	2656.2	45.1	2674.3	45.3	2692.5	45.4	2710.7	45.6	2728.9	45.7	22
23	2747.2	45.8	2765.6	46.0	2784.0	46.1	2802.5	46.2	2821.0	46.4	2839.6	46.5	2858.2	46.7	2876.9	46.8	2895.7	46.9	2914.5	47.1	23
24	2933.3	47.2	2952.2	47.4	2971.2	47.5	2990.2	47.6	3009.3	47.8	3028.5	47.9	3047.7	48.1	3066.9	48.2	3086.2	48.3	3105.6	48.5	24
25	3125.0	48.6	3144.5	48.8	3164.0	48.9	3183.6	49.0	3203.2	49.2	3222.9	49.3	3242.7	49.4	3262.5	49.6	3282.3	49.7	3302.2	49.9	25
26	3322.2	50.0	3342.2	50.1	3362.3	50.3	3382.5	50.4	3402.7	50.6	3422.9	50.7	3443.2	50.8	3463.6	51.0	3484.0	51.1	3504.5	51.2	26
27	3525.0	51.4	3545.6	51.5	3566.2	51.7	3586.9	51.8	3607.7	51.9	3628.5	52.1	3649.3	52.2	3670.2	52.4	3691.2	52.5	3712.2	52.6	27
28	3733.3	52.8	3754.5	52.9	3775.7	53.1	3796.9	53.2	3818.2	53.3	3839.6	53.5	3861.0	53.6	3882.5	53.8	3904.0	53.9	3925.6	54.0	28
29	3947.2	54.2	3968.9	54.3	3990.7	54.4	4012.5	54.6	4034.3	54.7	4056.2	54.9	4078.2	55.0	4100.2	55.1	4122.3	55.3	4144.5	55.4	29
	.0		.1		.2		.3		.4		.5		.6		.7		.8		.9		

TABLE XXXIII.—CUBIC SPIRAL FOR 1°30′ CURVE.

l	q	p	DEFLECTION ANGLES							
60	30.0	0.04	0°02.2′	0°09′						
90	45.0	0.09	0 01.5	0 06	0°13.5′					
120	60.0	0.16	0 01.1	0 04.5	0 10.1	0°18′				
150	75.0	0.25	0 00.9	0 03.6	0 08.1	0 14.4	0°22.5′			
180	90.0	0.35	0 00.8	0 03	0 06.8	0 12	0 18.8	0°27′		
210	105.0	0.48	0 00.6	0 02.6	0 05.8	0 10.3	0 16.1	0 23.1	0°31.5′	
240	120.0	0.63	0 00.6	0 02.2	0 05.1	0 09	0 14.1	0 20.2	0 27.6	0°36′
l	q	p	30	60	90	120	150	180	210	240
	y	x	DEGREE OF CURVE							
60	60.0	0.16	0°45′	1°30′						
90	90.0	0.35	0 30	1 00	1°30′					
120	120.0	0.63	0 22	0 45	1 08	1°30′				
150	150.0	0.98	0 18	0 36	0 54	1 12	1°30′			
180	180.0	1.41	0 15	0 30	0 45	1 00	1 15	1°30′		
210	210.0	1.92	0 13	0 26	0 39	0 51	1 04	1 17	1°30′	
240	240.0	2.51	0 11	0 22	0 34	0 45	0 56	1 08	1 19	1°30′
l	y	x	30	60	90	120	150	180	210	240

TABLE XXXIII.—CUBIC SPIRAL FOR 2° CURVE

l	q	p	DEFLECTION ANGLES									
60	30.0	0.05	0°03′	0°12′								
90	45.0	0.12	0 02	0 08	0°18′							
120	60.0	0.21	0 01.5	0 06	0 13.5	0°24′						
150	75.0	0.33	0 01.2	0 04.8	0 10.8	0 19.2	0°30′					
180	90.0	0.47	0 01	0 04	0 09	0 16	0 25	0°36′				
210	105.0	0.64	0 00.9	0 03.4	0 07.7	0 13.7	0 21.4	0 30.9	0°42′			
240	120.0	0.84	0 00.8	0 03	0 06.8	0 12	0 18.8	0 27	0 36.8	0°48′		
270	135.0	1.06	0 00.7	0 02.7	0 06	0 10.7	0 16.7	0 24	0 32.7	0 42.7	0°54′	
300	150.0	1.31	0 00.6	0 02.4	0 05.4	0 09.6	0 15	0 21.6	0 29.4	0 38.4	0 48.6	1°00′
l	q	p	30	60	90	120	150	180	210	240	270	300
	y	x	DEGREE OF CURVE									
60	60.0	0.21	1°00′	2°00′								
90	90.0	0.47	0 40	1 20	2°00′							
120	120.0	0.84	0 30	1 00	1 30	2°00′						
150	150.0	1.31	0 24	0 48	1 12	1 36	2°00′					
180	180.0	1.88	0 20	0 40	1 00	1 20	1 40	2°00′				
210	210.0	2.26	0 17	0 34	0 51	1 09	1 26	1 43	2°00′			
240	240.0	3.35	0 15	0 30	0 45	1 00	1 15	1 30	1 45	2°00′		
270	269.9	4.24	0 13	0 27	0 40	0 53	1 07	1 20	1 33	1 47	2°00′	
300	299.9	5.24	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2°00′
l	y	x	30	60	90	120	150	180	210	240	270	300

TABLE XXXIII.—CUBIC SPIRAL FOR 2°30′ CURVE

l	q	p	DEFLECTION ANGLES.														
			30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
60	30.0	0.07	0°03.8′	0°15′													
90	45.0	0.15	0 02.5	0 10	0°22.5′												
120	60.0	0.26	0 01.9	0 07.5	0 16.9	0°30′											
150	75.0	0.41	0 01.5	0 06	0 13.5	0 24	0°37.5′										
180	90.0	0.59	0 01.2	0 05	0 11.2	0 20	0 31.2	0°45′									
210	105.0	0.80	0 01.1	0 04.3	0 09.6	0 17.1	0 26.8	0 38.6	0°52.5′								
240	120.0	1.05	0 00.9	0 03.8	0 08.4	0 15	0 23.4	0 33.8	0 45.9	1°00′							
270	135.0	1.33	0 00.8	0 03.3	0 07.5	0 13.3	0 20.8	0 30	0 40.8	0 53.3	1°07.5′						
300	150.0	1.64	0 00.8	0 03	0 06.8	0 12	0 18.8	0 27	0 36.8	0 48	1 00.8	1°15′					
330	165.0	1.98	0 00.7	0 02.7	0 06.1	0 10.9	0 17	0 24.5	0 33.4	0 43.6	0 55.2	1 08.2	1°22.5′				
360	179.9	2.36	0 00.6	0 02.5	0 05.6	0 10	0 15.6	0 22.5	0 30.6	0 40	0 50.6	1 02.5	1 15.6	1°30′			
390	194.9	2.77	0 00.6	0 02.3	0 05.2	0 09.2	0 14.4	0 20.8	0 28.3	0 36.9	0 46.7	0 57.7	1 09.8	1 23.1	1°37.5′		

l	y	x	DEGREE OF CURVE.														
60	60.0	0.26	1°15′	2°30′													
90	90.0	0.59	0 50	1 40	2°30′												
120	120.0	1.05	0 38	1 15	1 52	2°30′											
150	150.0	1.64	0 30	1 00	1 30	2 00	2°30′										
180	180.0	2.36	0 25	0 50	1 15	1 40	2 05	2°30′									
210	210.0	3.21	0 21	0 43	1 04	1 26	1 47	2 09	2°30′								
240	239.9	4.19	0 19	0 38	0 56	1 15	1 34	1 52	2 11	2°30′							
270	269.9	5.30	0 17	0 33	0 50	1 07	1 23	1 40	1 57	2 13	2°30′						
300	299.9	6.54	0 15	0 30	0 45	1 00	1 15	1 30	1 45	2 00	2 15	2°30′					
330	329.8	7.92	0 14	0 27	0 41	0 55	1 08	1 22	1 35	1 49	2 03	2 16	2°30′				
360	359.8	9.42	0 12	0 25	0 38	0 50	1 02	1 15	1 28	1 40	1 52	2 05	2 18	2°30′			
390	389.7	11.06	0 12	0 23	0 35	0 46	0 58	1 09	1 21	1 32	1 44	1 55	2 07	2 18	2°30′		
l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

TABLE XXXIII.—CUBIC SPIRAL FOR 3° CURVE

l	q	p	DEFLECTION ANGLES.														
60	30.0	0.08	0°04.5′	0°18′													
90	45.0	0.18	0 03	0 12	0°27′												
120	60.0	0.31	0 02.2	0 09	0 20.2	0°36′											
150	75.0	0.49	0 01.8	0 07.2	0 16.2	0 28.8	0°45′										
180	90.0	0.71	0 01.5	0 06	0 13.5	0 24	0 37.5	0°54′									
210	105.0	0.96	0 01.3	0 05.1	0 11.6	0 20.6	0 32.1	0 46.3	1°03′								
240	120.0	1.26	0 01.1	0 04.5	0 10.1	0 18	0 28.1	0 40.5	0 55.1	1°12′							
270	135.0	1.59	0 01	0 04	0 09	0 16	0 25	0 36	0 49	1 04	1°21′						
300	150.0	1.96	0 00.9	0 03.6	0 08.1	0 14.4	0 22.5	0 32.4	0 44.1	0 57.6	1 12.9	1°30′					
330	164.9	2.38	0 00.8	0 03.3	0 07.4	0 13.1	0 20.5	0 29.5	0 40.1	0 52.4	1 06.3	1 21.8	1°39′				
360	179.9	2.83	0 00.8	0 03	0 06.8	0 12	0 18.8	0 27	0 36.8	0 48	1 00.8	1 15	1 30.8	1°48′			
390	194.9	3.32	0 00.7	0 02.8	0 06.2	0 11.1	0 17.3	0 24.9	0 33.9	0 44.3	0 56.1	1 09.2	1 23.8	1 39.7	1°57′		
420	209.9	3.86	0 00.6	0 02.6	0 05.8	0 10.3	0 16.1	0 23.1	0 31.5	0 41.1	0 52.1	1 04.3	1 17.8	1 32.6	1 48.6	2°06′	
450	224.9	4.43	0 00.6	0 02.4	0 05.4	0 09.6	0 15	0 21.6	0 29.4	0 38.4	0 48.6	1 00	1 12.6	1 26.4	1 41.4	1 57.6	2°15′
	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

l	y	x	DEGREE OF CURVE														
60	60.0	0.31	1°30′	3°00′													
90	90.0	0.71	1 00	2 00	3°00												
120	120.0	1.26	0 45	1 30	2 15	3°00′											
150	150.0	1.96	0 36	1 12	1 48	2 24	3°00′										
180	180.0	2.83	0 30	1 00	1 30	2 00	2 30	3°00′									
210	209.9	3.85	0 26	0 51	1 17	1 43	2 09	2 34	3°00′								
240	239.9	5.03	0 22	0 45	1 08	1 30	1 52	2 15	2 38	3°00′							
270	269.9	6.36	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3°00′						
300	299.8	7.85	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3°00′					
330	329.8	9.50	0 16	0 33	0 49	1 05	1 22	1 38	1 55	2 11	2 27	2 44	3°00′				
360	359.7	11.31	0 15	0 30	0 45	1 00	1 15	1 30	1 45	2 00	2 15	2 30	2 45	3°00′			
390	389.6	13.27	0 14	0 28	0 42	0 55	1 09	1 23	1 37	1 51	2 05	2 18	2 32	2 46	3°00′		
420	419.5	15.39	0 13	0 26	0 39	0 51	1 04	1 17	1 30	1 43	1 56	2 09	2 21	2 34	2 47	3°00′	
450	449.4	17.67	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2 00	2 12	2 24	2 36	2 48	3°00′

TABLE XXXIII.—CUBIC SPIRAL FOR 3° 30′ CURVE

l	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
60	30.0	0.09	0°05.2′	0°21′													
90	45.0	0.21	0 03.5	0 14	0°31.5′												
120	60.0	0.37	0 02.6	0 10.5	0 23.6	0°42′											
150	75.0	0.57	0 02.1	0 08.4	0 18.9	0 33.6	0°52.5′										
180	90.0	0.82	0 01.8	0 07	0 15.8	0 28	0 43.8	1°03′									
210	105.0	1.12	0 01.5	0 06	0 13.5	0 24	0 37.5	0 54	1°13.5′								
240	120.0	1.47	0 01.3	0 05.2	0 11.8	0 21	0 32.8	0 47.2	1 04.3	1°24′							
270	134.9	1.86	0 01.2	0 04.7	0 10.5	0 18.7	0 29.2	0 42	0 57.2	1 14.7	1°34.5′						
300	149.9	2.29	0 01	0 04.2	0 09.4	0 16.8	0 26.2	0 37.8	0 51.4	1 07.2	1 25	1°45′					
330	164.9	2.78	0 01	0 03.8	0 08.6	0 15.3	0 23.9	0 34.4	0 46.8	1 01.1	1 17.3	1 35.5	1°55.5′				
360	179.9	3.31	0 00.9	0 03.5	0 07.9	0 14	0 21.9	0 31.5	0 42.9	0 56	1 10.9	1 27.5	1 45.9	2°06′			
390	194.9	3.88	0 00.8	0 03.2	0 07.3	0 12.9	0 20.2	0 29.1	0 39.6	0 51.7	1 05.4	1 20.8	1 37.7	1 56.3	2°16.5′		
420	209.9	4.50	0 00.8	0 03	0 06.8	0 12	0 18.8	0 27	0 36.8	0 48	1 00.8	1 15	1 30.8	1 48	2 06.8	2°27′	
450	224.8	5.17	0 00.7	0 02.8	0 06.3	0 11.2	0 17.5	0 25.2	0 34.3	0 44.8	0 56.7	1 10	1 24.7	1 40.8	1 58.3	2 17.2	2°37.5′

DEGREE OF CURVE

l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
60	60.0	0.37	1°45′	3°30′													
90	90.0	0.82	1 10	2 20	3°30′												
120	120.0	1.47	0 52	1 45	2 38	3°30′											
150	150.0	2.29	0 42	1 24	2 06	2 48	3°30′										
180	179.9	3.30	0 35	1 10	1 45	2 20	2 55	3°30′									
210	209.9	4.49	0 30	1 00	1 30	2 00	2 30	3 00	3°30′								
240	239.9	5.86	0 26	0 52	1 19	1 45	2 11	2 38	3 04	3°30′							
270	269.8	7.42	0 23	0 47	1 10	1 33	1 57	2 20	2 43	3 07	3°30′						
300	299.7	9.16	0 21	0 42	1 03	1 24	1 45	2 06	2 27	2 48	3 09	3°30′					
330	329.7	11.09	0 19	0 38	0 57	1 16	1 35	1 55	2 14	2 33	2 52	3 11	3°30′				
360	359.6	13.19	0 18	0 35	0 52	1 10	1 28	1 45	2 02	2 20	2 38	2 55	3 12	3°30′			
390	389.4	15.48	0 16	0 32	0 48	1 05	1 21	1 37	1 53	2 09	2 25	2 42	2 58	3 14	3°30′		
420	419.3	17.96	0 15	0 30	0 45	1 00	1 15	1 30	1 45	2 00	2 15	2 30	2 45	3 00	3 15	3°30′	
450	449.2	20.61	0 14	0 28	0 42	0 56	1 10	1 24	1 38	1 52	2 06	2 20	2 34	2 48	3 02	3 16	3°30′

TABLE XXXIII.—CUBIC SPIRAL FOR 4° CURVE

l	q	p	DEFLECTION ANGLES														
60	30.0	0.10	0°06′	0°24′													
90	45.0	0.24	0 04	0 16	0°36′												
120	60.0	0.42	0 03	0 12	0 27	0°48′											
150	75.0	0.65	0 02.4	0 09.6	0 21.6	0 38.4	1°00′										
180	90.0	0.94	0 02	0 08	0 18	0 32	0 50	1°12′									
210	105.0	1.28	0 01.7	0 06.9	0 15.4	0 27.4	0 42.9	1 01.7	1°24′								
240	119.9	1.68	0 01.5	0 06	0 13.5	0 24	0 37.5	0 54	1 13.5	1°36′							
270	134.9	2.12	0 01.3	0 05.3	0 12	0 21.3	0 33.3	0 48	1 05.3	1 25.3	1°48′						
300	149.9	2.62	0 01.2	0 04.8	0 10.8	0 19.2	0 30	0 43.2	0 58.8	1 16.8	1 37.2	2°00′					
330	164.9	3.17	0 01.1	0 04.4	0 09.8	0 17.5	0 27.3	0 39.3	0 53.5	1 09.8	1 28.4	1 49.1	2°12′				
360	179.9	3.78	0 01	0 04	0 09	0 16	0 25	0 36	0 49	1 04	1 21	1 40	2 01	2°24′			
390	194.8	4.44	0 00.9	0 03.7	0 08.3	0 14.8	0 23.1	0 33.2	0 45.2	0 59.1	1 14.8	1 32.3	1 51.7	2 12.9	2°36′		
420	209.8	5.15	0 00.9	0 03.4	0 07.7	0 13.7	0 21.4	0 30.9	0 42	0 54.9	1 09.4	1 25.7	1 43.7	2 03.4	2 24.9	2°48′	
450	224.8	5.92	0 00.8	0 03.2	0 07.2	0 12.8	0 20	0 28.8	0 39.2	0 51.2	1 04.8	1 20	1 36.8	1 55.2	2 15.2	2 36.8	3°00′
l	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

l	y	x	DEGREE OF CURVE														
60	60.0	0.42	2°00′	4°00′													
90	90.0	0.94	1 20	2 40	4°00′												
120	120.0	1.68	1 00	2 00	3 00	4°00′											
150	150.0	2.62	0 48	1 36	2 24	3 12	4°00′										
180	179.9	3.77	0 40	1 20	2 00	2 40	3 20	4°00′									
210	209.9	5.13	0 34	1 09	1 43	2 17	2 51	3 26	4°00′								
240	239.8	6.70	0 30	1 00	1 30	2 00	2 30	3 00	3 30	4°00′							
270	269.8	8.48	0 27	0 53	1 20	1 47	2 13	2 40	3 07	3 33	4°00′						
300	299.7	10.47	0 24	0 48	1 12	1 36	2 00	2 24	2 48	3 12	3 36	4°00′					
330	329.6	12.67	0 22	0 44	1 05	1 27	1 49	2 11	2 33	2 55	3 16	3 38	4°00′				
360	359.4	15.08	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4°00′			
390	389.3	17.69	0 18	0 37	0 55	1 14	1 32	1 51	2 09	2 28	2 46	3 05	3 23	3 42	4°00′		
420	419.1	20.52	0 17	0 34	0 51	1 09	1 26	1 43	2 00	2 17	2 34	2 51	3 09	3 26	3 43	4°00′	
450	448.9	23.56	0 16	0 32	0 48	1 04	1 20	1 36	1 52	2 08	2 24	2 40	2 56	3 12	3 28	3 44	4°00′
l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

TABLE XXXIII.—CUBIC SPIRAL FOR 4°30′ CURVE

l	q	p	DEFLECTION ANGLES														
60	30.0	0.12	0°06.8′	0°27′													
90	45.0	0.26	0 04.5	0 18	0°40.5′												
120	60.0	0.47	0 03.4	0 13.5	0 30.4	0°54′											
150	75.0	0.74	0 02.7	0 10.8	0 24.3	0 43.2	1°07.5′										
180	90.0	1.06	0 02.2	0 09	0 20.2	0 36	0 56.2	1°21′									
210	104.9	1.44	0 01.9	0 07.7	0 17.4	0 30.9	0 48.2	1 09.4	1°34.5′								
240	119.9	1.89	0 01.7	0 06.8	0 15.2	0 27	0 42.2	1 00.8	1 22.7	1°48′							
270	134.9	2.39	0 01.5	0 06	0 13.5	0 24	0 37.5	0 54	1 13.5	1 36	2°01.5′						
300	149.9	2.95	0 01.4	0 05.4	0 12.2	0 21.6	0 33.8	0 48.6	1 06.2	1 26.4	1 49.4	2°15′					
330	164.9	3.57	0 01.2	0 04.9	0 11	0 19.6	0 30.7	0 44.2	1 00.1	1 18.5	1 39.4	2 02.7	2°28.5′				
360	179.8	4.25	0 01.1	0 04.5	0 10.1	0 18	0 28.1	0 40.5	0 55.1	1 12	1 31.1	1 52.5	2 16.1	2°42′			
390	194.8	5.00	0 01	0 04.2	0 09.3	0 16.6	0 26	0 37.4	0 50.9	1 06.5	1 24.1	1 43.8	2 05.7	2 29.5	2°55.5′		
420	209.8	5.80	0 01	0 03.9	0 08.7	0 15.4	0 24.1	0 34.7	0 47.2	1 01.7	1 18.1	1 36.4	1 56.7	2 18.9	2 43	3°09′	
450	224.7	6.67	0 00.9	0 03.6	0 08.1	0 14.4	0 22.5	0 32.4	0 44.1	0 57.6	1 12.9	1 30	1 48.9	2 09.6	2 32.1	2 56.4	3°22.5′
l	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

l	y	x	DEGREE OF CURVE														
60	60.0	0.47	2°15′	4°30′													
90	90.0	1.06	1 30	3 00	4°30′												
120	120.0	1.88	1 08	2 15	3 22	4°30′											
150	149.9	2.94	0 54	1 48	2 42	3 36	4°30′										
180	179.9	4.24	0 45	1 30	2 15	3 00	3 45	4°30′									
210	209.9	5.77	0 39	1 17	1 56	2 34	3 13	3 51	4°30′								
240	239.8	7.54	0 34	1 08	1 41	2 15	2 49	3 22	3 56	4°30′							
270	269.7	9.54	0 30	1 00	1 30	2 00	2 30	3 00	3 30	4 00	4°30′						
300	299.6	11.78	0 27	0 54	1 21	1 48	2 15	2 42	3 09	3 36	4 03	4°30′					
330	329.4	14.25	0 25	0 49	1 14	1 38	2 03	2 27	2 52	3 16	3 41	4 05	4°30′				
360	359.3	16.96	0 22	0 45	1 08	1 30	1 52	2 15	2 38	3 00	3 22	3 45	4 08	4°30′			
390	389.1	19.90	0 21	0 42	1 02	1 23	1 44	2 05	2 25	2 46	3 07	3 28	3 48	4 09	4°30′		
420	418.9	23.08	0 19	0 39	0 58	1 17	1 36	1 56	2 15	2 34	2 54	3 13	3 32	3 51	4 11	4°30′	
450	448.6	26.50	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3 00	3 18	3 36	3 54	4 12	4°30′
l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

TABLE XXXIII.—CUBIC SPIRAL FOR 5° CURVE

l	q	p	DEFLECTION ANGLES														
60	30.0	0.13	0°07.5′	0°30′													
90	45.0	0.29	0 05	0 20	0°45′												
120	60.0	0.52	0 03.8	0 15	0 33.8	1°00′											
150	75.0	0.82	0 03	0 12	0 27	0 48	1°15′										
180	90.0	1.18	0 02.5	0 10	0 22.5	0 40	1 02.5	1°30′									
210	104.9	1.60	0 02.1	0 08.6	0 19.3	0 34.3	0 53.6	1 17.1	1°45′								
240	119.9	2.10	0 01.9	0 07.5	0 16.9	0 30	0 46.9	1 07.5	1 31.9	2°00′							
270	134.9	2.65	0 01.7	0 06.7	0 15	0 26.7	0 41.7	1 00	1 21.7	1 46.7	2°15′						
300	149.9	3.28	0 01.5	0 06	0 13.5	0 24	0 37.5	0 54	1 13.5	1 36	2 01.5	2°30′					
330	164.8	3.97	0 01.4	0 05.5	0 12.3	0 21.8	0 34.1	0 49.1	1 06.8	1 27.3	1 50.5	2 16.4	2°45′				
360	179.8	4.73	0 01.2	0 05	0 11.2	0 20	0 31.2	0 45	1 01.2	1 20	1 41.2	2 05	2 31.2	3°00′			
390	194.7	5.56	0 01.2	0 04.6	0 10.4	0 18.5	0 28.8	0 41.5	0 56.5	1 13.8	1 33.5	1 55.4	2 19.6	2 46.2	3°15′		
420	209.7	6.45	0 01.1	0 04.3	0 09.6	0 17.1	0 26.8	0 38.6	0 52.5	1 08.6	1 26.8	1 47.1	2 09.6	2 34.3	3 01.1	3°30′	
450	224.6	7.42	0 01	0 04	0 09	0 16	0 25	0 36	0 49	1 04	1 21	1 40	2 01	2 24	2 49	3 16	3°45′
l	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

l	y	x	DEGREE OF CURVE														
60	60.0	0.52	2°30′	5°00′													
90	90.0	1.18	1 40	3 20	5°00′												
120	120.0	2.09	1 15	2 30	3 45	5°00′											
150	149.9	3.27	1 00	2 00	3 00	4 00	5°00′										
180	179.9	4.71	0 50	1 40	2 30	3 20	4 10	5°00′									
210	209.8	6.41	0 43	1 26	2 09	2 51	3 34	4 17	5°00′								
240	239.7	8.37	0 38	1 15	1 52	2 30	3 08	3 45	4 22	5°00′							
270	269.6	10.60	0 33	1 07	1 40	2 13	2 47	3 20	3 53	4 27	5°00′						
300	299.5	13.09	0 30	1 00	1 30	2 00	2 30	3 00	3 30	4 00	4 30	5°00′					
330	329.3	15.83	0 27	0 55	1 22	1 49	2 16	2 44	3 11	3 38	4 05	4 33	5°00′				
360	359.1	18.84	0 25	0 50	1 15	1 40	2 05	2 30	2 55	3 20	3 45	4 10	4 35	5°00′			
390	388.9	22.11	0 23	0 46	1 09	1 32	1 55	2 18	2 42	3 05	3 28	3 51	4 14	4 37	5°00′		
420	418.6	25.65	0 21	0 43	1 04	1 26	1 47	2 09	2 30	2 51	3 13	3 34	3 56	4 17	4 39	5°00′	
450	448.3	29.44	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20	3 40	4 00	4 20	4 40	5°00′
l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

TABLE XXXIII.—CUBIC SPIRAL FOR 5°30′ CURVE

l	q	p	DEFLECTION ANGLES														
60	30.0	0.14	0°08.2′	0°33′													
90	45.0	0.32	0 05.5	0 22	0°49.5′												
120	60.0	0.58	0 04.1	0 16.5	0 37.1	1°06′											
150	75.0	0.90	0 03.3	0 13.2	0 29.7	0 52.8	1°22.5′										
180	89.9	1.29	0 02.8	0 11	0 24.8	0 44	1 08.8	1°39′									
210	104.9	1.76	0 02.4	0 09.4	0 21.2	0 37.7	0 58.9	1 24.9	1°55.5′								
240	119.9	2.31	0 02.1	0 08.2	0 18.6	0 33	0 51.6	1 14.2	1 41.1	2°12′							
270	134.9	2.92	0 01.8	0 07.3	0 16.5	0 29.3	0 45.8	1 06	1 29.8	1 57.3	2°28.5′						
300	149.8	3.61	0 01.6	0 06.6	0 14.8	0 26.4	0 41.2	0 59.4	1 20.8	1 45.6	2 13.6	2°45′					
330	164.8	4.37	0 01.5	0 06	0 13.5	0 24	0 37.5	0 54	1 13.5	1 36	2 01.5	2 30	3°01.5′				
360	179.8	5.21	0 01.4	0 05.5	0 12.4	0 22	0 34.4	0 49.5	1 07.4	1 28	1 51.4	2 17.5	2 46.4	3°18′			
390	194.7	6.12	0 01.3	0 05.1	0 11.4	0 20.3	0 31.7	0 45.7	1 02.2	1 21.2	1 42.8	2 06.9	2 33.6	3 02.8	3°34.5′		
420	209.6	7.11	0 01.2	0 04.7	0 10.6	0 18.9	0 29.5	0 42.4	0 57.8	1 15.4	1 35.5	1 57.9	2 22.6	2 49.7	3 19.2	3°51′	
450	224.6	8.17	0 01.1	0 04.4	0 09.9	0 17.6	0 27.5	0 39.6	0 53.9	1 10.4	1 29.1	1 50	2 13.1	2 38.4	3 05.9	3 35.6	4°07.5′
l	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

l	y	x	DEGREE OF CURVE														
60	60.0	0.58	2°45′	5°30′													
90	90.0	1.30	1 50	3 40	5°30′												
120	120.0	2.30	1 22	2 45	4 08	5°30′											
150	149.9	3.60	1 06	2 12	3 18	4 24	5°30′										
180	179.9	5.18	0 55	1 50	2 45	3 40	4 35	5°30′									
210	209.8	7.05	0 47	1 34	2 21	3 09	3 56	4 43	5°30′								
240	239.7	9.21	0 41	1 22	2 04	2 45	3 26	4 08	4 49	5°30′							
270	269.5	11.66	0 37	1 13	1 50	2 27	3 03	3 40	4 17	4 53	5°30′						
300	299.4	14.39	0 33	1 06	1 39	2 12	2 45	3 18	3 51	4 24	4 57	5°30′					
330	329.2	17.42	0 30	1 00	1 30	2 00	2 30	3 00	3 30	4 00	4 30	5 00	5°30′				
360	358.9	20.73	0 28	0 55	1 22	1 50	2 18	2 45	3 12	3 40	4 08	4 35	5 02	5°30′			
390	388.6	24.32	0 25	0 51	1 16	1 42	2 07	2 32	2 58	3 23	3 48	4 14	4 39	5 05	5°30′		
420	418.3	28.21	0 24	0 47	1 11	1 34	1 58	2 21	2 45	3 09	3 32	3 56	4 19	4 43	5 06	5°30′	
450	447.9	32.39	0 22	0 44	1 06	1 28	1 50	2 12	2 34	2 56	3 18	3 40	4 02	4 24	4 46	5 08	5°30′
l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450

TABLE XXXIII.—CUBIC SPIRAL FOR 6° CURVE.

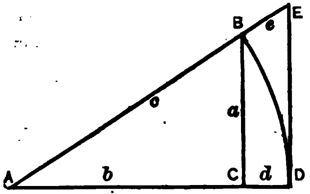
l	q	p	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
60	30.0	0.16	0°09′	0°36′													
90	45.0	0.35	0 06	0 24	0°54′												
120	60.0	0.63	0 04.5	0 18	0 40.5	1°12′											
150	75.0	0.98	0 03.6	0 14.4	0 32.4	0 57.6	1°30′										
180	89.9	1.41	0 03	0 12	0 27	0 48	1 15	1°48′									
210	104.9	1.92	0 02.6	0 10.3	0 23.1	0 41.1	1 04.3	1 32.6	2°06′								
240	119.9	2.51	0 02.2	0 09	0 20.2	0 36	0 56.2	1 21	1 50.2	2°24′							
270	134.8	3.19	0 02	0 08	0 18	0 32	0 50	1 12	1 38	2 08	2°42′						
300	149.8	3.94	0 01.8	0 07.2	0 16.2	0 28.8	0 45	1 04.8	1 28.2	1 55.2	2 25.8	3°00′					
330	164.8	4.77	0 01.6	0 06.5	0 14.7	0 26.2	0 40.9	0 58.9	1 20.2	1 44.7	2 12.5	2 43.6	3°18′				
360	179.7	5.69	0 01.5	0 06	0 13.5	0 24	0 37.5	0 54	1 13.5	1 36	2 01.5	2 30	3 01.5	3°36′			
390	194.6	6.68	0 01.4	0 05.5	0 12.5	0 22.2	0 34.6	0 49.8	1 07.8	1 28.6	1 52.2	2 18.5	2 47.5	3 19.4	3°54′		
420	209.6	7.77	0 01.3	0 05.1	0 11.6	0 20.6	0 32.1	0 46.3	1 03	1 22.3	1 44.1	2 08.6	2 35.6	3 05.1	3 37.3	4°12′	
450	224.5	8.93	0 01.2	0 04.8	0 10.8	0 19.2	0 30	0 43.2	0 58.8	1 16.8	1 37.2	2 00	2 25.2	2 52.8	3 22.8	3 55.2	4°30′

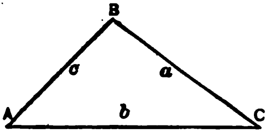
DEGREE OF CURVE

l	y	x	30	60	90	120	150	180	210	240	270	300	330	360	390	420	450
60	60.0	0.63	3°00′	6°00′													
90	90.0	1.41	2 00	4 00	6°00′												
120	120.0	2.51	1 30	3 00	4 30	6°00′											
150	149.9	3.93	1 12	2 24	3 36	4 48	6°00′										
180	179.8	5.65	1 00	2 00	3 00	4 00	5 00	6°00′									
210	209.7	7.69	0 51	1 43	2 34	3 26	4 17	5 09	6°00′								
240	239.6	10.05	0 45	1 30	2 15	3 00	3 45	4 30	5 15	6°00′							
270	269.5	12.72	0 40	1 20	2 00	2 40	3 20	4 00	4 40	5 20	6°00′						
300	299.3	15.70	0 36	1 12	1 48	2 24	3 00	3 36	4 12	4 48	5 24	6°00′					
330	329.0	19.04	0 33	1 05	1 38	2 11	2 44	3 16	3 49	4 22	4 55	5 27	6°00′				
360	358.7	22.61	0 30	1 00	1 30	2 00	2 30	3 00	3 30	4 00	4 30	5 00	5 30	6°00′			
390	388.4	26.53	0 28	0 55	1 23	1 51	2 18	2 46	3 14	3 42	4 09	4 37	5 05	5 32	6°00′		
420	418.0	30.77	0 26	0 51	1 17	1 43	2 09	2 34	3 00	3 26	3 51	4 17	4 43	5 09	5 34	6°00′	
450	447.5	35.33	0 24	0 48	1 12	1 36	2.00	2 24	2 48	3 12	3 36	4 00	4 24	4 48	5 12	5 36	6°00′

TABLE XXXIV. NUMBERS AND FORMULAS.

	Symbol.	Number.	Logarithm.
Ratio of circumference to diameter Area of circle (πr^2) radius = 1 Surface of sphere (πd^2) diam. = 1	π	3.14159	0.497150
Reciprocal of same	$\frac{1}{\pi}$	0.31831	9.502850
Area of circle $\left(\frac{\pi d^2}{4}\right)$ diameter = 1 . .	$\frac{1}{4}\pi$	0.78540	9.895090
Volume of sphere ($\frac{4}{3}\pi r^3$) radius = 1 .	$\frac{4}{3}\pi$	4.18879	0.622089
Area of sector of circle (length of arc = l)	$\frac{1}{2}lr.$		
Area of segment of parabola (c = chord; m = mid. ord.)	$\frac{2}{3}cm.$		
Area of segment of circle (ap.)	$\frac{2}{3}cm.$		
Base of hyperbolic logarithms	e	2.71828	0.434294
Modulus of common system of logs. = log e	M	0.43429	9.637784
Reciprocal of same = hyp. log. 10 . . .	$\frac{1}{M}$	2.30259	0.362216
Length of seconds pendulum at N. Y. (inches)		39.1017	1.592196
Acceleration due to gravity at New York	g	32.15949	1.507309
Cubic inches in 1 U. S. gallon		231	2.363612
Cubic inches in 1 Imperial gallon . . .		277.274	2.442909
U. S. gallons in 1 cubic foot		7.4805	0.873931
Imperial gallons in 1 cubic foot . . .		6.2321	0.794634
Feet in 1 meter		3.280869	0.515989
Inches in 1 meter		39.37	1.595165
Miles in 1 kilometer		0.62137	9.793350
Square feet in 1 square meter		10.7641	1.031978
Cubic feet in 1 cubic meter		35.3156	1.547967
Pounds (Av.) in 1 kilogram		2.20462	0.343334
Ton in 1 tonne		0.98421	9.993086
Ft.-lbs. in 1 kilogram-meter		7.23308	0.859323
Feet in 1 mile		5280	3.722634
Square feet in 1 acre		43560	4.639088





SOLUTION OF RIGHT TRIANGLES.

1. $\sin A=\frac{a}{c}=\cos B$

2. $\cos A=\frac{b}{c}=\sin B$

3. $\tan A=\frac{a}{b}=\cot B$

4. $\cot A=\frac{b}{a}=\tan B$

5. $\sec A=\frac{c}{b}=\operatorname{cosec} B$

6. $\operatorname{cosec} A=\frac{c}{a}=\sec B$

7. $\operatorname{vers} A=\frac{c-b}{c}=\frac{d}{c}$

8. $\operatorname{exsec} A=\frac{e}{c}$

9. $a=c\sin A=b\tan A=c\cos B=b\cot B=\sqrt{(c+b)(c-b)}$

10. $b=c\cos A=a\cot A=c\sin B=a\tan B=\sqrt{(c+a)(c-a)}$

11. $d=c\operatorname{vers} A$

12. $e=c\operatorname{exsec} A$

13. $c=\frac{a}{\cos B}=\frac{b}{\sin B}=\frac{a}{\sin A}=\frac{b}{\cos A}=\frac{d}{\operatorname{vers} A}=\frac{e}{\operatorname{exsec} A}$

SOLUTION OF OBLIQUE TRIANGLES.

Given.	Sought.	Formulas.
14. A, B, a	b, c	$b=\frac{a}{\sin A}\cdot\sin B,\qquad c=\frac{a}{\sin A}\sin(A+B)$
15. A, a, b	B, c	$\sin B=\frac{\sin A}{a}\,.\,b,\qquad c=\frac{a}{\sin A}\cdot\sin C.$
16. C, a, b	$A-B$	$\tan\frac{1}{2}(A-B)=\frac{a-b}{a+b}\tan\frac{1}{2}(A+B)$
17. a, b, c	A	Let $s=\frac{1}{2}(a+b+c)$; $\sin\frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{bc}}$
18.		$\cos\frac{1}{2}A=\sqrt{\frac{s(s-a)}{bc}}$; $\tan\frac{1}{2}A=\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$
19.		$\sin A=\frac{2\sqrt{s(s-a)(s-b)(s-c)}}{bc}$;
20.		$\operatorname{vers} A=\frac{2(s-b)(s-c)}{bc}$
21.	area	$\text{area}=\sqrt{s(s-a)(s-b)(s-c)}$
22. A, B, C, a	area	$\text{area}=\frac{a^2\sin B\,.\,\sin C}{2\sin A}$
23. C, a, b	area	$\text{area}=\frac{1}{2}ab\sin C.$

GENERAL FORMULAS.

24. $\sin A = 2\sin\tfrac{1}{2}A\cos\tfrac{1}{2}A = \sqrt{1-\cos^2 A} = \tan A\cos A$

25. $\cos A = 2\cos^2\tfrac{1}{2}A - 1 = 1 - 2\sin^2\tfrac{1}{2}A = \cos^2\tfrac{1}{2}A - \sin^2\tfrac{1}{2}A$

26. $\tan A = \dfrac{\sin A}{\cos A} = \dfrac{\sin 2A}{1+\cos 2A}$

27. $\cot A = \dfrac{\cos A}{\sin A} = \dfrac{\sin 2A}{1-\cos 2A} = \dfrac{\sin 2A}{\operatorname{vers} 2A}$

28. $\operatorname{vers} A = 1 - \cos A = \sin A\tan\tfrac{1}{2}A = 2\sin^2\tfrac{1}{2}A$

29. $\operatorname{exsec} A = \sec A - 1 = \tan A\tan\tfrac{1}{2}A = \dfrac{\operatorname{vers} A}{\cos A}$

30. $\sin 2A = 2\sin A\cos A$

31. $\cos 2A = 2\cos^2 A - 1 = \cos^2 A - \sin^2 A = 1 - 2\sin^2 A$

32. $\tan 2A = \dfrac{2\tan A}{1-\tan^2 A}$

33. $\cot 2A = \dfrac{\cot^2 A - 1}{2\cot A}$

34. $\operatorname{vers} 2A = 2\sin^2 A = 2\sin A\cos A\tan A$

35. $\operatorname{exsec} 2A = \dfrac{2\tan^2 A}{1-\tan^2 A}$

36. $\sin^2 A + \cos^2 A = 1$

37. $\sin(A \pm B) = \sin A\cdot\cos B \pm \sin B\cdot\cos A$

38. $\cos(A \pm B) = \cos A\cdot\cos B \mp \sin A\cdot\sin B$

39. $\sin A + \sin B = 2\sin\tfrac{1}{2}(A+B)\cos\tfrac{1}{2}(A-B)$

40. $\sin A - \sin B = 2\cos\tfrac{1}{2}(A+B)\sin\tfrac{1}{2}(A-B)$

41. $\cos A + \cos B = 2\cos\tfrac{1}{2}(A+B)\cos\tfrac{1}{2}(A-B)$

42. $\cos B - \cos A = 2\sin\tfrac{1}{2}(A+B)\sin\tfrac{1}{2}(A-B)$

43. $\sin^2 A - \sin^2 B = \cos^2 B - \cos^2 A = \sin(A+B)\sin(A-B)$

44. $\cos^2 A - \sin^2 B = \cos(A+B)\cos(A-B)$

45. $\tan A + \tan B = \dfrac{\sin(A+B)}{\cos A\cdot\cos B}$

46. $\tan A - \tan B = \dfrac{\sin(A-B)}{\cos A\cdot\cos B}$

SIMPLE CURVE FORMULAS.

(1) $\sin \frac{1}{2} D = \frac{50}{R}$

(2) $R = \frac{50}{\sin \frac{1}{2} D}$

(4) $R_a = \frac{5730}{D_a}$ (ap.)

(5) $T = R \tan \frac{1}{2} I$

(6) $T_a = \frac{T_1}{D_a}$ (ap.)

(7) $E = R \operatorname{exsec} \frac{1}{2} I$

(8) $E_a = \frac{E_1}{D_a}$ (ap.)

(9) $M = R \operatorname{vers} \frac{1}{2} I$

(10) $C = 2 R \sin \frac{1}{2} I$

(11) $R = T \cot \frac{1}{2} I$

(12) $R = \frac{E}{\operatorname{exsec} \frac{1}{2} I}$

(13) $R = \frac{M}{\operatorname{vers} \frac{1}{2} I}$

(14) $R = \frac{C}{2 \sin \frac{1}{2} I}$

(15) $D_a = \frac{5730}{R_a}$ (ap.)

(16) $D_a = \frac{T_1}{T_a}$ (ap.)

(17) $D_a = \frac{E_1}{E_a}$ (ap.)

(18) $c = 2 R \sin \frac{1}{2} d$

(19) $\frac{c}{100} = \frac{d}{D}$ (ap.)

(20) $d = \frac{cD}{100}$

(22) $\frac{d}{2} = c \times 0.3' \times D_a$ (min.)

(23) $L = 100 \frac{I}{D}$ (ap.)

(24) $I = \frac{LD}{100}$ (ap.)

(25) $D = \frac{100 I}{L}$

(26) $a = \frac{c^2}{2 R} \quad a_{100} = \frac{100^2}{2 R}$

(27) $a_n = \frac{1}{3} n^2 D_a$ (ap.)

(28) $a_n = \frac{1}{3} n^2 (D_f - D_i)$ (ap.)

(29) $a_i = a_{100} \frac{c_i^2}{100^2}$

(30) $c - a = \frac{h^2}{2 c}$ (ap.) $= \frac{h^2}{2 a}$ (ap.)

(31) $M = R - \sqrt{R^2 - \left(\frac{c}{2}\right)^2}$

(32) $M = R - \sqrt{\left(R - \frac{c}{2}\right)\left(R + \frac{c}{2}\right)}$

(33) Ordinate $= \sqrt{(R + q)(R - q)} - \sqrt{\left(R + \frac{c}{2}\right)\left(R - \frac{c}{2}\right)}$

(34) $M = \frac{c^2}{8 R}$ (ap.)

(35) Offset $= \frac{q^2}{\left(\frac{c}{2}\right)^2} M$ (ap.)

(36) Ordinate $= \frac{AQ \times QB}{2 R}$ (ap.)

(37) $AA' = \frac{p}{\sin I}$

(38) $R - R' = \frac{p}{\operatorname{vers} I}$

(39) $BB' = 2 (R - R') \sin \frac{1}{2} I$

(40) $R - R' = \frac{p}{\operatorname{vers} I}$

(41) $R - R' = \frac{p}{\operatorname{exsec} I}$

(42) $AA' = (R - R') \tan I$

COMPOUND AND REVERSED CURVES.

(46) $\text{vers}\, I_l = \dfrac{T_s \sin I - R_s \,\text{vers}\, I}{R_l - R_s}$

(47) $T_l = (R_l - R_s) \sin I_l + R_s \sin I - T_s \cos I.$ Also (49).

(48) $R_l - R_s = \dfrac{T_s \sin I - R_s \,\text{vers}\, I}{\text{vers}\, I_l}$

(50) $\tan \frac{1}{2} I_l = \dfrac{T_s \sin I - R_s \,\text{vers}\, I}{T_l + T_s \cos I - R_s \sin I}$

(51) $R_l - R_s = \dfrac{T_l + T_s \cos I - R_s \sin I}{\sin I_l}$

(52) $\text{vers}\, I_s = \dfrac{R_l \,\text{vers}\, I - T_l \sin I}{R_l - R_s}$

(53) $T_s = R_l \sin I - (R_l - R_s) \sin I_s - T_l \cos I.$ Also (55).

(54) $R_l - R_s = \dfrac{R_l \,\text{vers}\, I - T_l \sin I}{\text{vers}\, I_s}$

(56) $\tan \frac{1}{2} I_s = \dfrac{R_l \,\text{vers}\, I - T_l \sin I}{R_l \sin I - T_l \cos I - T_s}$

(57) $R_l - R_s = \dfrac{R_l \sin I - T_l \cos I - T_s}{\sin I_s}$

(64) $\text{vers}\, I_l' = \text{vers}\, I_l \pm \dfrac{p}{R_l - R_s}$

(67) $\text{vers}\, I_s' = \text{vers}\, I_s \mp \dfrac{p}{R_l - R_s}$

(68) $R_l - R_s = \dfrac{(R_l - R_c) \sin \frac{1}{2} I}{\sin \frac{1}{2} I_s}$

(69) $\sin \frac{1}{2} I_s = \dfrac{(R_l - R_c) \sin \frac{1}{2} I}{R_l - R_s}$

(70) $R_l = \dfrac{R_c \sin \frac{1}{2} I - R_s \sin \frac{1}{2} I_s}{\sin \frac{1}{2} I - \sin \frac{1}{2} I_s}$

(71) $\text{vers}\, I_r = \dfrac{\frac{1}{2} p}{R}$ (72) $R = \dfrac{\frac{1}{2} p}{\text{vers}\, I_r}$

(73) $R = \dfrac{d^2}{4p}$ (74) $d = 2\sqrt{Rp}.$

(75) $R_1 + R_2 = \dfrac{p}{\text{vers}\, I_r}$ (76) $\text{vers}\, I_r = \dfrac{p}{R_1 + R_2}$

(78) $R = \dfrac{l}{\tan \frac{1}{2} I_A + \tan \frac{1}{2} I_B}$

(79) $\text{vers}\, I_2 = \dfrac{R_1 \,\text{vers}\, I + T_1 \sin I}{R_1 + R_2}$

(80) $T_2 = T_1 \cos I + R_1 \sin I - (R_1 + R_2) \sin I_2$

(81) $\text{vers}\, I_1 = \dfrac{R_2 \,\text{vers}\, I + T_2 \sin I}{R_1 + R_2}$

(82) $T_1 = T_2 \cos I + R_2 \sin I + (R_1 + R_2) \sin I_1$

PARABOLAS, TURNOUTS, AND SPIRALS.

(83) $y^2 = 4p'x$

(86) $a_1 = \frac{g - g'}{4n}$

(87) $n = \frac{g - g'}{4a_1}$

(89) $\cot \frac{1}{2} F = 2n$

(91) $R + \frac{g}{2} = \frac{g}{\text{vers } F}$

(92) $E = \left(R + \frac{g}{2}\right) \sin F$

(95) $E = 2ng$

(96) $R = 2n^2 g$

(97) $l = 2n\sqrt{gt}$

(100) $n_c = 0.7071\, n_f$ (ap.)

(101) $\tan \frac{1}{2} O = \frac{gn}{R_m}$

(102) $R_t = \frac{gn}{\tan \frac{1}{2}(F \pm O)}$

(103) $E = 2\left(R_m \mp \frac{g}{2}\right) \sin \frac{1}{2} O$

(104) $D_t = D \pm D_m$ (ap.)

(114) $R + \frac{g}{2} = \frac{g - t}{\cos S - \cos F}$

(115) $E = l + \frac{g - t}{\tan \frac{1}{2}(F + S)}$

(116) $R + \frac{g}{2} = \frac{g - t - k \sin F}{\cos S - \cos F}$

(118) $R_2 - \frac{g}{2} = \frac{p - g}{\text{vers } F}$

(119) $R_2 - \frac{p}{2} = (p - g)\, 2n^2$

(120) $l = \frac{p - 2R \text{ vers } F}{\sin F}$

(121) $R_2 - \frac{g}{2} = \frac{p - g - l \sin F}{\text{vers } F}$

(123) $\tan \frac{1}{2} O = \frac{(p - g)n}{R_m \pm \frac{p}{2}}$

(124) $R_t - \frac{p}{2} = \frac{(p - g)n}{\tan \frac{1}{2}(F \pm O)}$

(140) $e = \frac{gv^2}{32 \cdot 2R}$

(141) $R = \frac{R_c l_c}{l}$

(141 A) $\frac{D}{D_c} = \frac{l}{l_c}$

(142) $s = \frac{l^2}{2 R_c l_c}$

(143) $x = \frac{y^3}{6 R_c l_c}$

(144) $x = \frac{l^3}{6 R_c l_c}$

(145) $s_c = \frac{\frac{l_c}{2}}{R_c}$

(146) $i = \frac{s}{3}$; $i_c = \frac{s_c}{3}$

(146 A) $i = i_c \left(\frac{l}{l_c}\right)^2$

(148) $q = y_c - R_c \sin s_c$

(148 A) $p = x_c - R_c \text{ vers } s_c$

(149) $T_s = q + T_c + p \tan \frac{1}{2} I$

(149 A) $T_{s_1} = q_1 + T_c + \frac{p_2}{\sin I} - \frac{p_1}{\tan I}$

(150) $h = \frac{p}{\cos \frac{1}{2} I}$

(150 A) $d = q + p \tan \frac{1}{2} I$

(151) $R_1 - R_2 + h = \frac{h + p}{\text{vers } \frac{1}{2} I}$

(151 A) $d = q - (R_1 - R_2 + h) \sin \frac{1}{2} I$

(152) $R_1 - R_2 = \frac{p}{\text{vers } (I_2 + s_c)}$

(152 A) $d = q - (R_1 - R_2) \sin (I_2 + s_c)$

EARTHWORK.

(153) $r_g = h_i - h_g$

(154) $r_{g_1} = r_{g_0} - g$

(155) $c = r_g - r_c$

(156) $d = \frac{1}{2} b + sc$

(157) $d_r = \frac{1}{2} b + sh_r$

(158) $S = \frac{A_0 + A_1}{2} \cdot l$

(160) $A = c(b + sc)$

(161) $A = \frac{c(d_l + d_r) + \frac{b}{2}(h_l + h_r)}{2}$

(162) $A = \left(c + \frac{b}{2s}\right)\frac{D}{2} - \frac{b^2}{4s}$

(163) $A = \frac{cb + f_r d_r + f_l d_l}{2}$

(163 *A*) $S = (A_0 + 4M + A_1)\frac{l}{6}$

(166) $C = \frac{l}{12}(b_1 - b_0)(h_1 - h_0)$

(167) $C = \frac{l}{12}(c_1 - c_0)(D_1 - D_0)$ (ft.)

(168) $C_{100} = \frac{1}{3.24}(c_1 - c_0)(D_1 - D_0)$ (yds.)

(169) $S_p = S_e - C$

(169 *A*) $S_{p_l} = \frac{l}{100}(S_{e_{100}} - C_{100})$

(173) $C = \left(\frac{b}{2} + sc\right)(h_r - h_l)(d_r + d_l) \times 0.00011\,D$ (yds.)

(174) $C = \left(\frac{b}{2} + sc\right)(h_r - h_l)(d_r + d_l)\frac{l_0 + l_1}{200} \times 0.00011\,D$ (yds.)

(176) $s_1 = \frac{f_l}{15}\left(d_l + p_l - \frac{b}{2}\right)^2$

(178) $s_3 = \frac{(f_l p_l + f_r p_r)b}{4}$

(179) $S = A\frac{h_1 + h_2 + h_3}{3}$

(180) $S = A\frac{h_1 + h_2 + h_3 + h_4}{4}$

(183) $S_t = A\frac{t_1 + 2t_2 + 3t_3 + 4t_4}{4}$

(186 *A*) $S = L + K(h_l + h_r - 2_c)$

(185) $S = A\frac{h_1 + h_2 + h_3 + h_4}{4} + \frac{A}{3}\left(h_c - \frac{h_1 + h_2 + h_3 + h_4}{4}\right)$

(185 *A*) $S = A\frac{h_1 + h_2 + h_3 + h_4}{4} + \frac{A}{3}\left(h_m - \frac{h_1 + h_2}{2}\right)$

(187) $S_{e_{100}} = S_0 + S_1$

(188) $S_{e_l} = (S_0 + S_1)\frac{l}{100}$

(190) $S_{p_l} = (S_0 + S_1 - C)\frac{l}{100}$

(191) $S = \frac{50}{54}aB$

(204) $x_g = \frac{l^2}{12} \cdot \frac{A_1 - A_0}{S}$ (ft.)

(206) $x_{g_{100}} = \frac{100}{6} \cdot \frac{S_1 - S_0}{S}$

(207) $x_{g_l} = x_{g_{100}} \cdot \frac{l}{100}$

(208) $X_{g_{100}} = \frac{100}{6} \cdot \frac{S_o - S_n}{S}$

EXPLANATION OF TABLES.

For all Circular Curves except Metric Curves the degree *D* is the central angle subtended by a chord of 100 feet.

Table I. The Radius is computed from the Logarithm, and the latter is in general, therefore, superior in precision. A few of the large Radii at the beginning of this table are taken from ten-place tables and are superior in precision to the corresponding Logarithms. For many computations the Logarithms are more convenient than the Radii themselves.

Table II. Tangent Offsets and Middle Ordinates.

These are given for chords of 100 feet.

Table III. } Tangent Distances for a 1° Curve.
Table IV. } Correction for Tangent Distances.

The intersection angle *I* is marked by degrees at the top and minutes at the side. The tangent distance for a curve of any specified degree is obtained by taking from Table III. the tabular number for the given intersection angle, and dividing this by the specified degree of curve. This gives a result approximately correct. The correct result may be obtained by applying from Table IV. the correction for the specified degree of curve and the given intersection angle. This correction is to be added *after dividing* by the degree of curve.

Example. Degree = 9°. Intersection angle = 60° 48′.
Tabular number = 3361.6(9 = *D*.
373.51 approx. value *T*.
.38 = correction 9° and 61°.
373.9 = correct value for Tangent Distance.

Table V. External Distances for a 1° Curve.

For any specified degree, divide the tabular number by the specified degree of curve. The result is closely approximate. No table of corrections is given for this. Where definite precision is required, find result by logarithmic computation.

TABLE VI. Offsets from Tangent for a 10° Curve.
TABLE VII. Angles Proportional to Squares of Distances.

Table VI. gives offsets for every foot and tenth to 300 feet. Table VII. gives for various angles (expressed in minutes) the corresponding angle (proportional to the squares of distances) for one tenth, two tenths, etc., of the total distance. These are specially valuable in connection with easement curves. In the "cubic spiral" the offset to the circular curve (produced until parallel with tangent) is found to be one third of the "tangent deflection" distance for a circular curve of length one half that of the easement curve; and the same is substantially true of the "cubic parabola." The "total deflection angle" at the end of the spiral is one third of the central angle for the above stated length of circular curve, and other "total deflection angles" are as the squares of the distances from the point of spiral.

Table VI. will aid in solving the first part, and Table VII. the second part, of a problem of this sort.

The offset for a 2° curve will be $\frac{2}{10}$ the offset for a 10°, and for other degrees in similar proportion.

Example. Degree = 6°. Chord = 219.7 feet.

Table VI. Tabular number = 42.068
multiply by 0.6
25.2408
offset for a 6° curve = 25.24

Example for Cubic Spiral.

Degree = 4°. Offset = 1.90
3
Offset from tangent 4° curve = 5.70(0.4 { Since 4° is $\frac{4}{10}$ of 10°, divide by 0.4.
Offset from tangent 10° = 14.25
Table VI. Chord length = 128.0
2
Length of spiral = 256.0
Central angle 128 ft. 4° curve = 5.12°
= 5°7.2′ = 307.2′
Deflection angle = $\frac{1}{3}$ × 307.2 = 102′

Table VII. gives deflection angles for chord lengths of $\frac{1}{10}$ × 256 = 25.6 ft. as follows:— 1′; 4′; 9 ; 16.5′; 25.5′; 36.5 ; 50′; 65.5′; 82.5′. These are opposite 102′ in Table VII.

Similarly the length of the spiral may be assumed and the offset determined (*i.e.* corresponding to 1.90 above). It will be noted that the back deflection at any point is twice the forward deflection to that point, and the spiral angle or total angle turned is three times the forward deflection angle at that point.

Table VI. may be used wherever offsets are required.

Table VII. can also be used to find offset distances to an ordinary parabola (not cubic parabola), since it is also a table of numbers (or ordinates) proportional to squares of distances (or abscissas.)

TABLE VIII. Long Chords and Actual Arcs.

The actual arc for any given number of full stations may be found by multiplying the length of arc for one station by the number of stations. Actual arcs corresponding to sub-chords may be found by finding the angle and then multiplying the radius by the value taken from Table XX.

TABLE IX. Acres for Strip 100 Feet Wide.

The fractions of acres are carried to hundredths. The "Lengths in Feet" are the limits between which the acres (or fraction of acre) apply.

Example. How many acres in 1146.97 lineal feet? 1146.97 lies between 1143.45 and 1147.81, between which we find 2.63, the required number of acres.

TABLE X. Curves for Metric System.

This is computed on the basis that the Degree of Curve equals the Deflection Angle for a chord of 20 meters, or very nearly that the Degree of Curve is the central angle subtended by a chord of 10 meters or 1 station in length. The radius, the chord, length, offset, or other linear dimensions on the metric curve will be $\frac{2}{10}$ that of U.S. curves of double the degree or nearly $\frac{1}{10}$ those of U.S. curves of the same degree. The table shows the corresponding U.S. degree for each metric curve given.

TABLE XI. Barometric Tables.

The approximate difference in heights in feet is found by taking the difference between the tabular numbers corresponding to the observed readings of the barometer in inches. Temperature correction is made by the formula $\frac{T + t - 100}{1000}$ which is easily computed when necessary. The corrected difference in heights $D = (H - h)\left(1 + \frac{T + t - 100}{1000}\right)$ where H and T represent barometer and thermometer readings at one station and h, t, at the other.

Examples. Barometer Readings 29.83 28.17
Thermometer 75° 62°

Tabular number 28.17 2609
29.83 1049
1560

$$\text{Temp. corr.} = \frac{75 + 62 - 100}{1000} = \frac{37}{1000}$$

1.037
1560
6222
5185
1037
1617.720

Diff. in height = 1618 ft.

Table XII. Logarithms of Numbers.

Where there are more than four significant figures, the table of proportional parts will be found useful. The star opposite certain logarithms shows that the two figures at the left are to be taken from the line below.

Example. Required log of 6723.46.

For left 672 and top 3 the logarithm = .827563 and diff. = 65.

Table of prop. parts 65 gives 26 for 4
4 for .6
3.827593

the characteristic 3 being one less than the number of significant figures to the left of the decimal point, in 6723.46.

Example. To find number for log 2.672962
Log of 4709 = .672929
33
Diff. = 92; for 3 prop. part = 28
5.
.5 prop. part = 4.6
Number is 470.935

TABLE XIII. Logarithmic Sines, Cosines, Tangents, and Cotangents.

In taking out degrees and minutes, use the minutes at the left with the degrees at the left, whether the degrees appear at top or at bottom of page; use the minutes at right in a similar way with the degrees at right. Use headings for Sin., Cos., Tan., Cot., as given at top with the degrees shown at top (whether right or left); use headings for Cos., Sin., Tan., Cot., as given at bottom with the degrees given at bottom (whether right or left). The difference for 1 second is given for every minute, and is to be multiplied by the number of seconds and the result added or subtracted.

For very small angles up to 5°, where results precise for the nearest second are required, Table XIV should be used.

TABLE XIV. Auxiliary Table for Logarithmic Sines and Tangents of Small Angles.

This table is computed upon the basis (approximately true) that the sines of small angles, or the tangents of small angles, are proportional to the angles themselves.

Example. Required log sin 0° 47′ 12″.

Then
$$\frac{\sin 47' \, 12''}{\sin 47'} = \frac{47' \, 12''}{47'}$$

$$\sin 47' \, 12' = 47' \, 12'' \frac{\sin 47'}{47'} = 2832'' \frac{\sin 47'}{2820''}$$

$$\begin{array}{lrl} \log \sin & 47' = & 8.135810 \\ \log & 2820'' = & \underline{3.450249} \\ & & 4.685561 \\ \log & 2832'' = & \underline{3.452093} \\ \log \sin & 47'12'' = & 8.137654 \end{array}$$

This auxiliary table gives for 47′, shown in the example above, the value of log sin 47′ − log 2820″ = 4.685561 as appears above, and for each minute in similar fashion; the number given in the table, then, is to be added to the log of the required angle (given in seconds). It should be noted that the table gives the value of every minute in seconds. As above 47′ = 2820″; whence also 47′12″ = 2832″.

Example. Required angle whose log sin = 8.325327.
Log sin $1^\circ 13'$ is the nearest (Table XIII).

Required log sin = 8.325327
Table XIV (sin) $1^\circ 13'$ = 4.685542
$4363''$ log = 3.639785
or $1^\circ 12' 43''$ = required angle.

Example. Required log sin $3^\circ 19' 34''$.

Table XIV. value for $3^\circ 19'$ (sin) = 4.685332
$3^\circ 20'$ = 4.685330
Interpolate tabular value for $3^\circ 19' 34''$ = 4.685331
Then log $11974''$ = 4.078239
log sin $3^\circ 19' 34''$ = 8.763570

Table XV. Logarithmic Versed Sines and External Secants.
No explanation appears necessary.

Table XVI.

It may be shown that $\operatorname{vers} A = 2 \sin^2 \frac{1}{2} A$, whence it follows that for small angles it is approximately true that the vers of angles are as the squares of the angles themselves.

Example. $$\frac{\operatorname{vers} 0^\circ 41' 17''}{\operatorname{vers} 0^\circ 41'} = \frac{(0^\circ 41' 17'')^2}{(0^\circ 41')^2} = \frac{2477^2}{2460^2}$$

$$\operatorname{vers} 0^\circ 41' 17'' = 2477^2 \frac{\operatorname{vers} 0^\circ 41'}{2460^2}$$

The tabular number for $0^\circ 41'$ = log vers $0^\circ 41'$ − log 2460^2.
= 9.070115
2 log 2477 = 3.393926 × 2 = 6.787852
log vers $0^\circ 41' 17''$ = 5.857967

Example. Required angle whose log vers = 6.309065.
Log vers $1^\circ 9'$ is the nearest (Table XV.).

Required log vers = 6.309065
Table XVI (vers) $1^\circ 9'$ = 9.070105
7.238960(2
$4164''$ log = 3.619480
or $1^\circ 09' 24''$ = required angle

Similarly for external secants of small angles.

For exsec. of 90° – small angles, it may be shown that

$$\operatorname{exsec} A = \frac{\operatorname{vers} A}{\cos A}$$

$$\operatorname{exsec} 90^\circ - A = \frac{\operatorname{vers} 90^\circ - A}{\cos 90^\circ - A} = \frac{\operatorname{vers} 90^\circ - A}{\sin A}$$

where sin A may be taken from auxiliary tables.

TABLE XVII. Natural Sines and Cosines.
TABLE XVIII. Natural Tangents and Cotangents.

Use the minutes at the left with the degrees at the top, and the minutes on the right with the degrees at the bottom.

TABLE XIX. Natural Versed Sines and External Secants.

This requires no explanation.

TABLE XX. Lengths of Circular Arcs; Radius = 1.

To find the arc for a given angle and given radius, look out the tabular number for the given degrees, also for the minutes, also for the seconds. Add these together and multiply by the radius. The result will be the length of arc.

TABLE XXI. Squares, Cubes, Square Roots, Cube Roots, and Reciprocals.

This requires no explanation.

TABLE XXII. Turnouts and Switches.

The Frog Angles and Angles of Crotch Frog are good for any kind of turnout. The lead and length of switch rail are computed for Stub Switch only.

TABLE XXIII. Velocity Heights.

These are computed by the formula $H = 0.0355\ V^2$ which includes the effect due to the rotative energy of the wheels.

TABLE XXIV. Rise per Mile Various Grades.

TABLE XXV. Elevation of Outer Rail on Curves.

This table is based on the formula $e = \dfrac{gv^2D}{32.16 \times 5729.65}$

where $g = 4'\,8\tfrac{1}{2}''$

Table XXVI. Inches in Decimals of a Foot.

This table requires no special explanation.

Table XXVII. Middle Ordinate for Curving Rails.

This table gives in common fractions of an inch the middle ordinate for various lengths of rails. This will be more convenient for use than it would be if decimal fractions were to be used.

Table XXVIII. Stadia Reductions, Horizontal and Vertical.

In general, stadia wires are set so that the horizontal distance with the line of sight level will be 100 times the rod reading. In this case the horizontal distance at any observed angle will be the Hor. tabular number multiplied by the rod reading, to which must be added the value for c for that angle as shown at bottom of table. The vertical height will be the Vert. tabular number for the given angle multiplied by the rod reading with the value for c added. If the wires are set for a different proportion, the result must be modified in like proportion before adding c which will not be affected.

Example. Rod reading = 5.27 at 7° 37′ ; c = 1.00.

Tabular numbers are	98.25	and	13.14
	5.27		5.27
	68775		9198
	19650		2628
	49125		6570
	517.7775		6.92478
c	.99		.13
Hor. Dist. =	518.8		7.1 = Vert. Ht.

The use of the ordinary slide rule in connection with this table will allow results to be reached with little labor to the nearest foot in distance or tenth in elevation, which will be sufficiently close for many purposes.

TABLE XXIX. Mean refraction in Declination.

This table is copied from W. and L. E. Gurley's Manual by permission. The hour angle indicates the distance of the sun from the meridian; for example, 2 hours indicates either 10 A.M. or 2 P.M. For one hour either before or after noon the refraction may properly be taken the same as at noon, or 0 h.

Declinations north appear as + in the table, and the refraction is to be added. Similarly, declinations south appear as −, and refractions are to be subtracted. The refractions here given are to be applied to declinations taken from the Nautical Almanac, and a sufficient record of these must be made before going into the field.

Example. Required corrected declinations Monday, Sept. 11, 1905, at New Orleans. (Lat. 29° 57′ 46″; Long. $6^h\ 00^m\ 13.9^s$.)

Greenwich Mean Noon = 6 A.M. New Orleans (standard time).

Naut. Alm. gives Decl. N. or + 4° 43 16″, Diff. for 1 hour = 0′ 57″ (subtract).

New Orleans	Declination		Lat. 30° Decl. + 5° Refraction		
6 A.M.	+ 4° 43′ 16″				for 5^h = 1′ 52″ 4^h = 0′ 52″
	− 57″				
7	4° 42′ 19″	+	1′ 52″	=	4° 44′ 11″
	57″				
8	4° 41′ 22″	+	0′ 52″	=	4° 42′ 14″
9	4° 40′ 25″	+	0′ 39″	=	4° 41′ 04″
10	4° 39′ 28″	+	0′ 31″	=	4° 39′ 59″
11 A.M.	4° 38′ 31″	+	0′ 27″	=	4° 38′ 58″
12 M.	4° 37′ 34″	+	0′ 27″	=	4° 38′ 01″
1 P.M.	4° 36′ 37″	+	0′ 27″	=	4° 37′ 04″
2	4° 35 40″	+	0′ 31″	=	4° 36′ 11″
3	4° 34′ 43″	+	0′ 39″	=	4° 35′ 22″
4	4° 33′ 46″	+	0′ 52″	=	4° 34′ 38″
5	4° 32′ 49″	+	1′ 52″	=	4° 34′ 41″

Example. Required corrected declinations Monday, Feb. 6, 1905, at Denver. (Lat. 39° 45′ 00″; Long. $6^h\ 59^m\ 58.2^s$.)

Greenwich Mean Noon = 5 A.M. Denver (standard time).

Decl. S. or − 15° 43′ 46″ Diff. for 1 hour = 0′ 46″ (subtract).

Denver	Declination		Lat. 40° Decl. − 15° Refraction		
5 A.M.	− 15° 43′ 46″				for 5^h = 25′ 18″ (not suitable to use)
	46″				
6	15° 43′ 00″				for 4^h = 3′ 21″ for 3^h = 2′ 02″
	46″				
7	15° 42′ 14″				
8	15° 41′ 28″	−	3′ 21″	=	15° 38′ 07″
9	15° 40′ 42″	−	2′ 02″	=	15° 38′ 40″
10	15° 39′ 56″	−	1′ 35″	=	15° 38′ 21″
11 A.M.	15° 39′ 10″	−	1′ 21″	=	15° 37′ 49″
12 M.	15° 38′ 24″	−	1′ 21″	=	15° 37′ 03″
1 P.M.	15° 37′ 38″	−	1′ 21″	=	15° 36′ 17″
2	15° 36′ 52″	−	1′ 35″	=	15° 35′ 17″
3	15° 36′ 06″	−	2′ 02″	=	15° 34′ 04″
4	15° 35′ 20″	−	3′ 21″	=	15° 31′ 59″

TABLE XXX. Triangular Prisms.

Any end area of a section of earthwork may be divided into a number of areas, each triangular in form. This table gives the solidity in cubic yards of a triangular prism 50 feet in length, the factors required for the table being the height or altitude a and the width or base B, in accordance with the formula $S = \frac{50}{54} aB$. The end area solidity for 100 feet in length, due to two different end sections, will be the sum of the two solidities for the end sections, or

$$S_{e\,100} = S_0 + S_1$$

Example. Sta. $1 \; \frac{15.7}{-5.8} - 7.4 \; \frac{19.6}{-8.4}$

Base 14 ft.
Slope $1\frac{1}{2}$ to 1 $\quad 0 \; \frac{12.7}{-3.8} - 3.5 \; \frac{14.2}{-4.8}$

For Sta. o the calculation may be put in the form

$$\begin{aligned} S_0 &= \tfrac{50}{54}(3.5 \times \overline{12.7 + 14.2}) + \tfrac{50}{54}(7.0 \times \overline{3.8 + 4.8}) \\ &= \tfrac{50}{54}(3.5 \times 26.9) \qquad\qquad + \tfrac{50}{54}(7.0 \times 8.6) \end{aligned}$$

where the triangles are grouped in pairs, in which there is a common base for the two triangles in any pair.

Since the table is in the form $S = \frac{50}{54}aB$ the solidity for 20 will be 10 times that for 2, and the solidity for $\frac{2}{10}$ will be $\frac{1}{10}$ that for 2. The use of the table is then simple.

For instance, to find $\frac{50}{54}(19.3 \times 24.7)$, find

$$\begin{array}{lll} \text{from Table XXX.} & 19.3 & 20. = 357.4 \\ & & 4. = 71.5 \\ & & .7 = \underline{12.5} \\ & & S = 441.4 \end{array}$$

In the example given by notes above,

$$S_0 = \tfrac{50}{54}(3.5 \times 26.9) + \tfrac{50}{54}(7.0 \times 8.6)$$

$$\begin{array}{llllll} \text{from Table XXX.} & 26.9 & 3. & = 74.7 & & \\ & & .5 & \underline{12.5} & 87.2 & \\ & 8.6 & 7. & & \underline{55.7} & 142.9 \end{array}$$

$$S_1 = \tfrac{50}{54}(7.4 \times 35.3) + \tfrac{50}{54}(7.0 \times 14.2)$$

$$\begin{array}{llllll} \text{from Table XXX.} & 35.3 & 7. & = 228.8 & & \\ & & .4 & = \underline{13.1} & 241.9 & \\ & 14.2 & 7. & = & \underline{92.0} & \underline{333.9} \\ & \multicolumn{3}{r}{S_{100} = S_0 + S_1 =} & & 476.8 \end{array}$$

If the section be 80 feet long instead of 100, the correct result will be 476.8 × 0.8 = 381.44, and for any length in direct proportion.

Irregular sections of earthwork may also be divided into pairs of triangles, and each pair calculated for 50 feet in length by $S = \frac{50}{54} aB$. If divided into trapezoids the computation may still be put in the form $S = \frac{50}{54} aB$. In both these cases this table evidently applies.

Where speed is desired, each quantity may be taken from the table to the nearest yard only, and two or more parts added by mental arithmetic. The precision thus secured is generally superior to that of the field measurements, where a difference of 0.1 foot in the height of any cut or fill means, commonly, several yards difference in solidity.

TABLE XXXI. Prismoidal Correction.

This table gives the correction to be applied to the "end area" solidity to secure a result strictly correct by prismoidal formula. The table gives values for $C = \frac{1}{3.24}(c_1 - c_0)(D_1 - D_0)$. In this table also the correction for 20 will be 10 times that for 2, and the correction for $\frac{2}{10}$ will be $\frac{1}{10}$ that for 2.

Example. Use data given above for Table XXX (top p. 290). The correction will be

$$C = \frac{1}{3.24}(7.4 - 3.5)(\overline{19.6 + 15.7} - \overline{14.2 + 12.7})$$

$$= \frac{1}{3.24}(3.9)(35.3 - 26.9)$$

$$= \frac{1}{3.24}(3.9)(8.4)$$

from Table XXXI. 3.9 8. = 9.63

.4 = .48

10.11

From Example Table XXX. $S_{e100} = 476.8$

from above $C \quad = 10.1$

Correct Solidity $= S_{P100} = 466.7$

If the section be 80 feet long instead of 100, the correct result will be $466.7 \times 0.8 = 373.36$ and for any length in direct proportion.

The multiplication by 0.8 can best be made, as just above, *after applying the correction.*

Example. Sta. 1 $\frac{15.7}{-5.8} - 7.4\ \frac{19.6}{-8.4}$

Base 14 ft. $0\ \frac{12.7}{-3.8} - 3.5\ \frac{14.2}{-4.8}$
Slope 1½ to 1

For Sta. 0 the calculation may be put in the form

$$S_0 = \tfrac{50}{54}(3.5 \times \overline{12.7 + 14.2}) + \tfrac{50}{54}(7.0 \times \overline{3.8 + 4.8})$$
$$= \tfrac{50}{54}(3.5 \times 26.9) \qquad + \tfrac{50}{54}(7.0 \times 8.6)$$

where the triangles are grouped in pairs, in which there is a common base for the two triangles in any pair.

Since the table is in the form $S = \frac{50}{54}aB$ the solidity for 20 will be 10 times that for 2, and the solidity for $\frac{2}{10}$ will be $\frac{1}{10}$ that for 2. The use of the table is then simple.

For instance, to find $\frac{50}{54}(19.3 \times 24.7)$, find

from Table XXX. 19.3 20. = 357.4
4. = 71.5
.7 = 12.5
$S = 441.4$

In the example given by notes above,

$$S_0 = \tfrac{50}{54}(3.5 \times 26.9) + \tfrac{50}{54}(7.0 \times 8.6)$$

from Table XXX. 26.9 3. = [illegible]
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P.S.) and auxiliary tangent

2 × 2° 12′ = 4° 24′, and the

will be 3 × 2° 12′ = 6° 36′.

= 164.9 will be needed in find-

$+ T_c + p \tan \frac{1}{2} I,$

nce for circular curve.

Table XXXII. Earthwork for various bases and for slope 1½ to 1.

It applies only to regular "Three Level Sections." Each table gives for any center height two quantities under columns *L* or *K*. Column *L* gives the solidity in cubic yards of a level section 50 feet in length and of the given center height. Column *K* gives a quantity to be used in connection with the side heights. The figure from column *K* is to be multiplied by the difference between (*a*) the sum of the side heights, and (*b*) twice the center height, or $K(h_r + h_l - 2c)$ and the result is to be added or subtracted depending upon whether the arithmetical sum of the side heights is greater or less than twice the center height.

Example.	Sta. 1	$\frac{15.7}{-5.8} - 7.4 \frac{19.6}{-8.4}$
Base 14 feet Slope 1½ to 1	0	$\frac{12.7}{-3.8} - 3.5 \frac{14.2}{-4.8}$

Sta. 0	3.5 $L =$ 124.8	$K =$ 11.3	$3.8 = h_l$
	18.1	1.6	$4.8 = h_r$
	142.9	678	8.6
		113	$7.0 = 2c$
		18.08	1.6
Sta. 1	7.4 $L =$ 344.0	$K =$ 16.8	5.8
	− 10.1	− 0.6	8.4
	333.9	− 10.08	14.2
			14.8

$$S_0 = 142.9$$
$$S_1 = 333.9$$
$$S_{100} = 476.8$$

The results agree with those given for Table XXX. where the notes are the same.

TABLE XXXIII. Spiral Easement Curves.

In these tables the length of spiral is always some multiple of 30 feet. Spirals of various lengths are given to meet curves of even degree or half degree from 1° 30′ to 6° curves. Deflection angles are given for chord points at the end of each chord of 30 feet, and the degree of curve is also given at every such point. For each spiral the coördinates x and y are given for the point when the spiral meets the given circular curve. The offset p is the perpendicular distance from the tangent to the circular curve (produced) when it becomes parallel to the tangent, and the distance q is from the point opposite this (on tangent) to the point (beginning) of spiral *P.S.* It may be noted that, with the transit at any chord point on the spiral, the deflection angle from the chord (to *P.S.*) to auxiliary tangent will be twice the forward deflection to the same point. The spiral angle or total angle turned will be three times the forward deflection angle.

Example. Required a spiral 330 feet long to connect with a 4° curve.

Table XXXIII. gives deflection angles as follows: 01′, 04′, 10′, 17′, 27′, 39′, 53′, 1° 10′, 1° 28′, 1° 49′, 2° 12′.

The deflection between chord (to *P.S.*) and auxiliary tangent at *P.C.C.* (with 4° curve) will be $2 \times 2° \, 12' = 4° \, 24'$, and the spiral angle or total angle turned will be $3 \times 2° \, 12' = 6° \, 36'$.

The values of $p = 3.17$ and $q = 164.9$ will be needed in finding the tangent distance

$$T_s = q + T_c + p \tan \tfrac{1}{2} I,$$

where T_c = tangent distance for circular curve.

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